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ABSTRACT

This report analyzes file development efforts of the Resource and Referral Service project to determine the feasibility of computerizing a database of information on educational resource organizations. Background information on the project is presented in the introduction. The report describes present policies, identifies factors affecting computer feasibility, outlines design options, and makes recommendations for major system functions. Chapters address content and organization, selection, acquisition, processing, file maintenance, vocabulary development, search and retrieval, user products and services, recommendations, and implications for future database development. Current and proposed formats for processing organizational information are appended, along with vendor information for search and retrieval systems. (FM)

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A FEASIBILITY STUDY ON COMPUTERIZING THE RESOURCE AND REFERRAL SERVICE DATABASE

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ABSTRACT

This report analyzes file development efforts at the Resource and Referral Service project to determine the feasibility of computerizing a database of information on educational resource organizations. Background information on the project is presented in the Introduction. The report describes present policies, identifies factors affecting computer feasibility, outlines design options, and makes recommendations for major system functions. Chapter titles include Content and Organization, Selection, Acquisitions, Processing, File Maintenance, Vocabulary Development, Search and Retrieval, User Products and Services, and Summary of Recommendations and Implications for Future Database Development. Current and proposed formats for processing organizational information are appended, along with vendor information about search and retrieval systems. Major recommendations include adoption of a multi-level file structure with subfiles on organizational products, projects, and meetings; computerized file maintenance at Ohio State University facilities; and subcontract arrangements with commercial vendors for online interactive search services and computer typesetting of database publications.

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FOREWORD

The Resource and Referral Service is part of a nationwide dissemination system called the Research and Development Exchange (RDx) sponsored by the National Institute of Education. The Resource and Referral Service has developed a database of information about resource organizations which can assist state and local efforts to improve educational programs. Information products and services produced from this database are disseminated through a network of agencies located in regional educational laboratories. Known as Regional Exchanges, these agencies work closely with state departments of education to encourage the use of research and development based resources in solving local educational problems. Identifying the needs of practitioners for planning future research and development is another important RDx priority.

This computer feasibility study for the RRS database will be of particular interest to educators and other professionals involved in the planning, coordination, and management of information and dissemination systems. The need for current, accurate resource information available from the increasing number of organizations serving educators makes this publication especially timely. The Resource and Referral Service is making a valuable contribution toward the goals of improved coordination and more efficient utilization of an expanding educational resource base.

The profession is indebted to Charles W. Lynd, the National Center for Research in Vocational Education, The Ohio State University, for his scholarship in the preparation of this publication. Recognition is due John C. Peterson, Project Director, for his guidance and direction in the preparation of this publication.

Robert E.Taylor
Executive Director
National Center for Research in
Vocational Education

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RRS staff members have obtained valuable advice and consultation on all aspects of the project from a wide variety of experts and interested professionals. We would like to thank these individuals for their assistance, and highlight specific contributions and activities which have influenced the issues discussed and recommendations made in this report.

Richard Herlig, new with EDCOM Associates, Vienna, Virginia, and Charles Mokjowski, Educational Consulting Service, Cranston, Rhode Island, were two consultants who analyzed the RRS database early in 1978 to help assess the overall file building efforts and system design. Both Herlig and Mokjowski have had extensive experience in national and state level dissemination programs. Their reports were particularly helpful in conceptualizing how the RRS database could support and complement information systems being developed through state capacity building projects, as well as other national databases and file building projects.

Joseph Becker, President of Becker and Hayes, Inc. Brentwood, California, and member of The National Commission on Libraries and Information Science, consulted with RRS staff regarding the design of the database and potential for computerizing system functions. He was particularly helpful in outlining a spectrum of design options to be considered in relation to the variables of system usage, audiences served, size of the database, etc. Mr. Becker also provided references to individuals and organizations in the information community which were later contacted for assistance or information exchange.

John Price and staff members of the National Referral Center, operated by the Library of Congress, were very helpful in arranging to meet with RRS staff and share information about their services. This visit was especially useful in obtaining practical insights about the management and personnel requirements unique to information and referral services. Staff Rosenborg was able to explain and demonstrate the technical features of the Center's automated system. His willingness to describe the details of word processing equipment interfaced with their computerized database was especially helpful in understanding data entry and file management options within OSU's technical environment.

Gregory Benson's experience as Project Director of the National Education Practice File was very useful to RRS. He was able to consult with staff about all system functions and provide

helpful suggestions regarding the organization of this report. His insight into the structure of RRS files, and observations regarding the relationship between new RRS subfiles and other information systems was especially valuable.

Sharon Snapp, director of a computerized special education referral service for the state of Texas, shared with RRS staff her experience in managing a database organized by the cataloging of organizational resources. She was particularly helpful in explaining how to design a multilevel file structure to take maximum advantage of a computerized system. Her description of techniques and documentation required for conducting telephone surveys to acquire organizational resource information have already proved useful in modifying RRS acquisition policies.

Robert Moon of Andrews University in Berrien Springs, Michigan, provided numerous helpful suggestions based upon his familiarity with both computer technology and file management considerations. Dr. Moon prepared reports which were specific to the RRS project and which analyzed the hardware and software capabilities of the National Center's entire Information and Field Services Division. His assistance in analyxing software options and his creative ideas for translating these options into potential user products and services will continue to be a rich source for future planning.

Many individuals within the National Center for Research in Vocational Education and the Ohio State University shared their expertise with RRS staff to help clarify alternative system designs. Carl Oldsen's experience in managing information systems and consultations with related file building projects within the National Center have proved invaluable throughout the conducting of this study. Wesley Budke and staff members of the National Center's Information Clearinghouse project, which is implementing a computer-based tracking system in vocational education, have been very cooperative in helping RRS plan and coordinate future database activities.

Marta Fisch, programmer analyst for the National Center, was always available to explain technical aspects of file management procedures and share her experience in using OSU computer facilities. Several User Services Consultants at OSU's Instruction and Research Computer Center have visited with RRS staff and spent long hours on the telephone describing system features and compatibility requirements.

In addition to the letters from potential vendors for search and retrieval systems which appear in Appendix C, local service vendors in the Columbus area have also been contacted regarding data entry and file maintenance services, word processing, and computer typesetting systems and capabilities. These contacts have been very helpful in the preparation of this report.

Three persons reviewed the entire study and provided constructive criticism and helpful suggestions for the preparation of this report. Dane Manis, Director of the Midwest Regional Exchange at CEMREL, Inc., offered his perspective and insights as a participant within the RDx network and a user of RRS products and services. Joan Miller, Coordinator of the Educational Programs, Studies, and Information Services Unit in New York's state department of education, has also been involved in a planning grant for future regional exchange services in the northeastern states. Her experience in developing and managing computer-based information services was evident from her detailed comments and useful suggestions. Carl Oldsen, Research Specialist in the Information and Field Services Division of the National Center for Research in Vocational Education, was acknowledged previously for his inhouse assistance and consultation. His review of the final drafts proved to be equally helpful, and his assistance in formulating the recommendations for a computerized system was especially appreciated.

I would like to personally thank the RRS staff members who were always willing to discuss with me the myriad details involved in the operation of the project. Kacey Obremski, Resource Librarian for RRS, patiently explained current processing procedures and suggested many improvements. Janet Ray deserves a special recognition for her skill in typing and her talent for manipulating the word processing equipment to perform the functions which are making microprocessors popular. And finally I would like to thank John Peterson, Director of the Project, for his continuous support and assistance throughout the preparation of this report.

A FEASIBILITY STUDY ON COMPUTERIZING THE RESOURCE AND REFERRAL SERVICE DATABASE

I. INTRODUCTION

Background

In the fall of 1976, the National Institute of Education Dissemination and Resources Group launched a collaborative planning effort involving representatives from educational laboratories, research and development centers, state education agencies, intermediate agencies, and United States Office of Education regional offices. The purpose of the planning effort was to explore ways to bring educational research and development results to practitioners and to return (feedforward) information about practitioners' needs and concerns to educational researchers, developers, and their sponsors. This effort has come to be called the Research and Development Exchange (RDx).

The RDx has emerged as a viable dissemination system designed to support state and local school improvement efforts. Composed of seven Regional Exchanges, one Regional Planning effort, and four Central Services, the RDx has as its ultimate clients the students, teachers, and principals who attend and operate local schools. Because of the size and complexity of these client groups and the limited reosources to serve them, the RDx supports local dissemination and school improvement efforts by working through intermediary organizations. These include school districts, intermediate serve agencies, state eduation agencies, and national education assoicaionts. Currently, the RDx works primarily through state education agencies' (SEAs) dissemination and school improvement staffs.

The Resource and Referral Service (RRS) is one of the four Central Services. RRS has developed a database of information on over 1000 resource organizations which can assist educators through the dissemination of R&D-based products, services, information, or technical assistance. In addition, the Dissemination Support Services, a program of the Northwest Regional Educational Laboratory, Portland, Oregon, provides training and consultation in the design and delivery of staff development and dissemination services. The Research and Development Interpretation Service (RDIS) synthesizes R&D outcomes and assists educational practitioners in utilizing this R&D-based knowledge in this dissemination and school improvement efforts. RDIS is a program of CEMREL, Inc., St. Louis, Missouri. Finally, a System Support Service (SSS) coordinates RDx operations and offers support services

in documenting RDx operations. SSS is a program of the Far West Laboratory for Educational Research and Development, San Francisco, California.

As the RDx network has matured and achieved visibility in accomplishing its mission, RRS has been integrally involved through the provision of information services. The process of identifying reosurce information to support those who are attempting to improve schools through dissemination of new and innovative educational practices has been challenging. At the same time, RRS has been in close touch with the needs of practitioners while responding to requests for information and technical assistance.

Need for an Organization-Based Information System

There are many existing and emerging organizations engaged in the production and dissemination of research and development outcomes applicable to the solution of problems in education.

The regional educational laboratories and university-based centers are a rich resource for R&D-based outcomes readily available to the Research and Development Exchange (RDx). In addition, there are a great many organizations, systems, and networks sponsored by the Department of Health, Education, and Welfare. For example, the National Institute of Education sponsors the Educational Resources Information Center (ERIC) and its network of 16 ERIC Clearinghouses; a capacity building program which is helping states build their information resources and linking mechanisms; and a problem solving program aimed at developing consortia of agencies to impact on local educational problems. The United States Office of Education is sponsoring a National Diffusion Network of Facilitators and Developer/Demonstrators which is trying to achieve adoption of federally funded products and programs approved by the Joint Dissemination and Review Panel.

There are also a large number of private nonprofit and proprietary organizations conducting research and development under government or foundation support. Many research and development efforts are being conducted by colleges and universities under various schemes of support. There are many information clearinghouses which provide access to R&D outcomes, and there is an increasing need for coordination within this resource base.

Comprehensive information about these organizations and their personnel is needed by all of the Regional Exchanges. While each Regional Exchange will compile information about the resources in its own region and will be able to share this information across regions, it will not have information about the rich national resources available to it. There is a critical need for information about these national resources in carrying out the mission of the Regional Exchanges with state, intermediate and local education agencies.

Need for a Computer Feasibility Study

An efficient and effective referral service requires prompt, accurate, up-to-date information. As the RRS database has expanded to include more organizations and as the number of requests has increased, these basic operational goals have become threatened. As a result, the need for a computer feasibility study to assist in future database planning has become increasingly evident.

Table I contains data on the number of resource organizations which have been contacted for participation in the database. Literally thousands of initial contacts have been made; as the file matures, communication with these organizations must be maintained and strengthened. Table II shows that the number of requests for the services of RRS has more than doubled since the first three-month period when RRS began operations in March 1977. Requests for prepackaged, topical bibliographies on organizational resources have also increased dramatically. In the past 12-month period, July 1978 through June 1979, more than 100,000 Mini-Lists on 20 high priority topics have been distributed. These dynamic growth patterns document the need for careful analysis of system functions to determine ways to maintain and improve project services.

As RRS' services have become more widely disseminated and better known, organizations are keeping RRS project staff informed of recent publications, meetings, projects, and services. Thus, there is not only information about new organizations but new information about old organizations. Each request requires rapid access to accurate information. Current processing procedures only direct a searcher to possible organizations that are appropriate. Time-consuming, hand-search techniques are then used to locate any specific resources described in the organizational literature contained in the files.

Procedures for cataloging workshops, seminars, and meetings announced by participating resource organizations have been implemented. This "subfile" has demonstrated the utility of providing referrals to specific organizational resources. New subfiles on current organizational projects and products are contemplated to further improve access to database contents. The need for coordinating subfiles with the master organizational file provides additional impetus for a computer feasibility study.

The client base for RRS has been small. Initially there were five Regional Exchanges. Now there are seven Regional Exchanges and one planning effort. Discussions are being held at the National Institute of Education about redefining the RRS client audience to include the Regional Exchanges (7), Regional Services (5), Capacity Building Programs (33) and the State Dissemination Leadership Program. Other possible audiences could include the ERIC Clearinghouses (16). In addition, there has been

Table I

STATUS OF ORGANIZATIONAL FILES IN RRS DATABASE
(as of June 30, 1979)

Total 2772

- 1040 Organizations identified but not appropriate for RRS Database. (a)
- 477 Organizations identified but not yet decided upon by RRS.
- 1255 Organizations identified and asked to send materials for RRS Database.
  - 68 Organizations that are defunct or decline participation
  - 530 Organizations whose materials have not been received. (b)
  - 657 Organizations whose materials were received.
    - 101 Organizations processed into a State File.
    - 107 Organizations whose files have not been processed.
    - 449 Organizations whose files are complete and included in RRS Database.

NOTES: (a) Commercial, for-profit organizations are excluded from RRS Database.
(b) Follow-up procedures have been initiated.

Table II

NUMBER OF REQUESTS COMPLETED BY RRS PER QUARTER*

Quarter	Year 1 1977 - 78	Year 2 1978 - 79	Year 3 1979 - 80
March - May	29	37	71
June - August	12	33	23**
September - November	24	48	
December - February	25	56	
TOTAL	90	174	94**

*These figures represent only in depth requests for assistance in identifying resource information, averaging more than 6 hours of research per request.
**Number completed as of June 30, 1979.

considerable interest from participating resource organizations in using the database.

The decision to conduct this feasibility study was begun at a time when many of these growth factors were just beginning to be anticipated. As growth in terms of database size, information requests, and audiences served increased, the need for this study took on greater importance.

Relationship to Other Information Systems

Decisions about the RRS database should be made in the larger context of information and dissemination resource systems available to educators. Articulation and coordination are critical concerns due to the unique role of RRS as both referral agency and linker to organizations and their resources.

The National Referral Center (NRC), housed in the Division of Science and Technology at the Library of Congress, operates a computerized database of information about organizations active in the sciences and social sciences. Basic directory information, data about publications and library holdings, areas of interest, and LC Subject Headings are included for each entry. Entries are updated about every two years. Of the 11,000 records in the NRC files, nearly half are social science oriented, and 12.6% are classified as educational organizations. Search services are available free to Congress and the general public, and

various topical bibliographies are produced in response to frequently asked questions.

RRS staff members have visited with personnel at the NRC to explore similarities and differences between the two services. Although both agencies acquire, catalog, and disseminate organizational information, several differences became apparent. The main differences are reflected in the kinds of organizational descriptions (RRS includes more data on R&D projects and technical assistance services); the level of specificity in referral (RRS identifies specific products, programs, and meetings), and of course the audiences served.

NRC director, John Price, was extremely cooperative and helpful in explaining and demonstrating NRC services. Arrangements were made to share information, and a comprehensive printout of all education-related organizations in the NRC file has been used by RRS to identify new resource organizations and to supplement current profiles in the RRS files. RRS has shared both internal documentation and publications with NRC, and has established ongoing contact with the NRC Education Specialist. The two services can be seen as complementary, with RRS making referrals to NRC when references beyond its scope are requested, and NRC referring to RRS and RDx when more specific organizational resources for educators are required.

No other computerized databases on educational organizations were located, although several directories of educational organizations have been identified and used in RRS file building efforts. The ERIC Clearinghouse on Educational Management and the ERIC Clearinghouse on Social Studies/Social Science Education have produced very useful directories to serve their particular user audiences. Most ERIC Clearinghouses also maintain a vertical file to provide appropriate referrals when responding to information requests. Given the common funding source of both RRS/RDx and the ERIC Clearinghouses, continued cooperation, coordination, and eventually collaboration could be arranged to ensure efficient use of organizational resource information in making referrals and identifying potential acquisitions for the ERIC database.

RRS procedures for identifying specific organizational publications, products, projects and programs is of particular interest to the major education-related databases: e.g., ERIC, NICEM/NICSEM, the National Education Practice File, Smithsonian Science Information Exchange, the Interagency Research Information System, and others. Current and forthcoming resources announced in RRS publications are based upon information supplied by organizations participating in the database. Limited data are cataloged for referral purposes only, and no attempt is made to acquire, review, or process source documentation. Therefore major educational information systems and services can take advantage of RRS resource announcements to identify potential acquisitions for complete review and processing. At the same

time RRS could further support this process by directly encouraging participating resource organizations to submit their resources to appropriate information retrieval systems. The potential benefits from such a relationship between RRS, participating organizations, and other databases and clearinghouses would demonstrate maximum use of the communication linkages which RRS has developed thus far.

Purpose of the Study

There is sometimes confusion about the phrase "computer feasibility study" in that many persons assume that the results of such a study will provide support for an either/or decision--yes, the computer wins, or no, it's too expensive. This assumption can influence those who conduct computer feasibility studies to limit their analyses to technical and cost considerations at the expense of the broader conceptual issues which can be even more important for those who are responsible for the development and implementation of information systems.

The current state of the art of information technology is such that technical considerations for converting the RRS descriptions of organizational resources to machine readable form and manipulating this data to generate products and services are relatively minor. There are many alternatives, but choices are more likely to be dictated by in-place resources at the host site and access to national vendors by the system users than by the more subtle variables of hardware and software features.

A somewhat similar set of circumstances applies to cost considerations, but even relatively small budget increases cannot be considered minor. For RRS, even a very limited computerization of the file contents will result in budget increases if the current level of services are to be maintained. This study therefore examines closely the trade-offs and potential benefits to be expected if personnel are shifted from user oriented activities to new system support functions, or if personnel are added so that services do not have to be reduced.

The primary purpose of this study is to conceptualize the most appropriate design options for developing a computer-based system to support the mission of the Resource and Referral Service. A range of questions are addressed. Which present policies will need to be changed in order to make computerization more feasible? In what specific ways should present policies be changed? What will be the costs in terms of time, personnel, and level of services rendered? What hardware and software options are available? Who will access the database? What training efforts will be required? What new products and services can be expected? By analyzing system functions and suggesting design options, this study is intended to clarify potential answers to the above questions.

This study also makes definite recommendations, including timelines for implementing a computer-based system designed to improve the product and service delivery capabilities of RRS. But the options which are explored in the study leave ample room for variations in charting future directions for RRS. Since the very existence of a Resource and Referral Service in education is new, readers of this report will be challenged to respond creatively in judging the potential utility of this system. If the report stimulates interest and discussion among those who will ultimately determine the system design and future role of RRS, it will have served its purpose.

Organization of the Report

This feasibility study was conducted during the past 12 months in order to allow ample time for analyzing all project activities which would be affected by computerization, and to obtain advice and assistance from experts knowledgable about information and dissemination systems. Activities included interviews with each RRS staff member, discussions with consultants and representatives from both private and public agencies, and visits to other organizational facilities.

Chapters II through IX of this report attempt to address the significant issues involved for each of eight major system functions which would be affected by plans to computerize the RRS database. Within each chapter a common outline is used to explore relevant issues in detail. This outline includes the following parts:

Present Policies
  Discussion
  Factors influencing computer feasibility
Design Options
  Discussion
  Cost considerations and personnel requirements
  Recommendations

Present policies are described to acquaint the reader with procedures which are used by the RRS project to operate manually accessed files of information. A discussion of these policies allows further elaboration on any special circumstances or problems encountered in implementing the policies. This is followed by a section which identifies factors influencing computer feasibility. Based upon the analysis of each system function, an effort is made to anticipate the positive and negative consequences of computerizing the database from the perspective of that system function.

Design options are then presented in order to indicate a range of possible policy alternatives which would accommodate or improve present file development activities in the context of potential computerization. A discussion section follows with

additional information about the advantages and disadvantages of each design option. Cost considerations and personnel requirements focuses on the relative costs for each option and the anticipated need for personnel assigned to the system function being analyzed. Finally, a recommendation to implement a specific design option is made. Chapter X summarizes the recommendations and presents specific data associated with implementing a computerized RRS database. A timeline for accomplishing the objectives of the proposed system is also included.

II. CONTENT AND ORGANIZATION

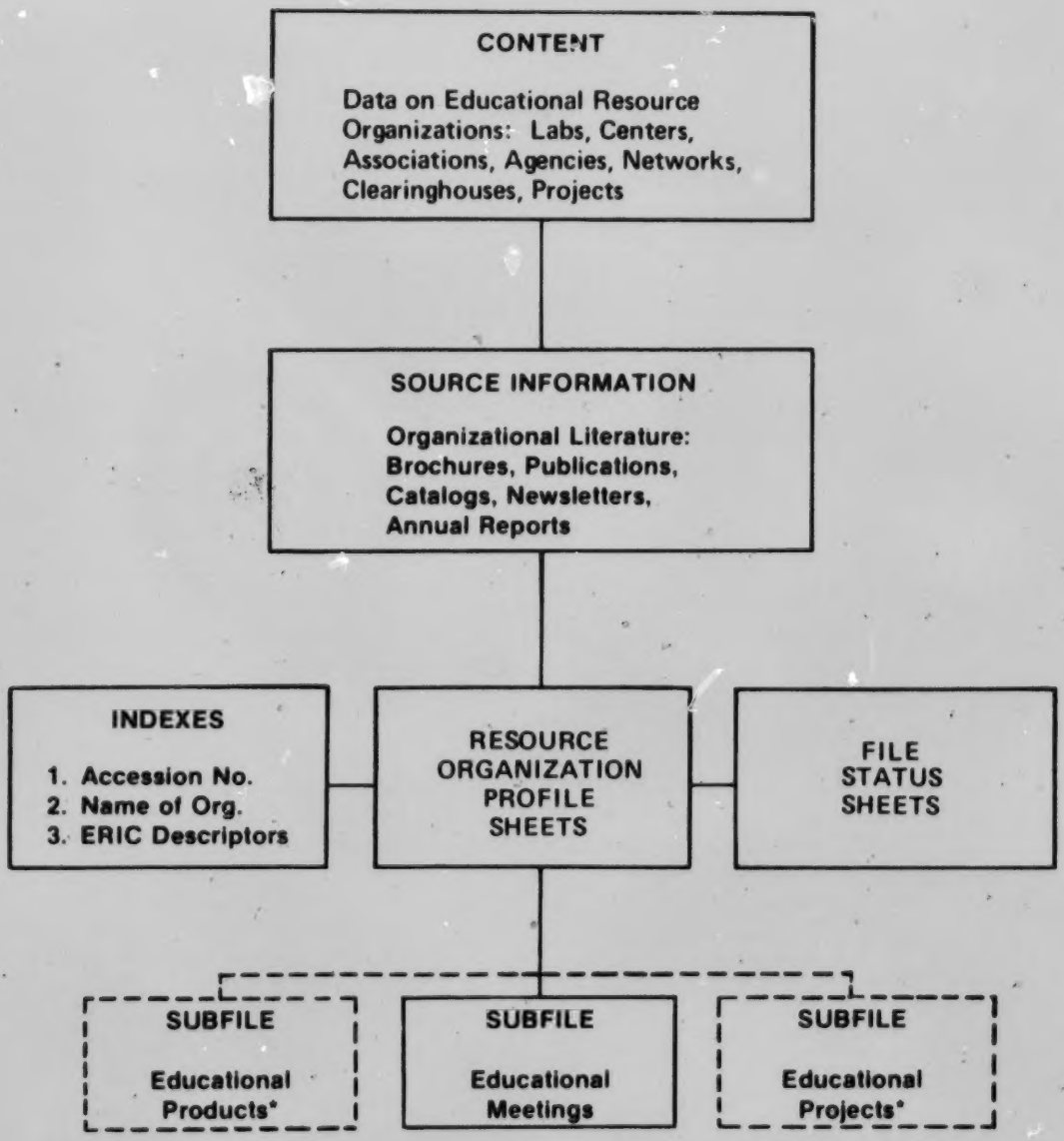
Present Policies

RRS collects information about resource organizations of interest to educators, including a wide variety of organizational forms such as professional associations, government agencies, research and development centers, information clearinghouses, dissemination networks, educational consortia, demonstration programs, advocacy groups, etc. Organizational literature is used to catalog and prepare an abstract of major resources, including (1) publications and information services; (2) research, development, and evaluation activities; and (3) training, consultation, or technical assistance services. Referral to specific resources or the "outcomes" resulting from these general organizational resources--i.e., products, projects, and meetings--is made routinely in responding to information requests and preparing bibliographic publications. Within the limitations of the selection criteria (discussed in the next section), there are no restrictions on the form of organizations or the type of organizational resources identified for referral purposes.

Discussion. At the present time the database can perhaps best be thought of as a well organized vertical file. The contents of the main file include: (1) miscellaneous organizational literature, which typically includes a publications catalog, newsletter, personnel directory, annual report, and brochures describing projects, programs, and meetings; (2) descriptive data with an abstract of the organization on a special resource organization profile form; and (3) a file status sheet which tracks the communications between RRS and the participating organization, including referrals to the organization made in preparing bibliographic publications and in responding to information requests. Access to the database is through card indexes organized by ERIC descriptors which refer to the accession number and (recently) to the acronym of the organization. Separate card indexes of organizations are organized alphabetically and by accession number. One additional card index on educational meetings has also been developed as a subfile to facilitate specific referrals. Figure 1 presents a schematic overview of the database.

For practical purposes it is not sufficient for RRS to merely provide a list of organizational descriptions to clients in need of specific information or assistance. A distinction between describing general organizational resources and describing, for referral purposes, specific outcomes such as publications,

Figure I: Content and Organization of RRS DATABASE



*Dotted lines represent possible new subfile components.

projects, and meetings is very useful in understanding the creation of subfiles within the RRS database. For example, in order to publish the Meetings Exchange, organizational newsletters and special announcements of meetings are examined prior to insertion in the main file in order to create a separate card index or subfile on upcoming meetings. This procedure has not yet been implemented for tracking new publications, products, and projects. In order to refer to these specific organizational resources in Mini-Lists (RRS publications which list 8-15 organizations with annotations describing specific resources available on a high priority topic) or when responding to information requests, a time-consuming, custom search of each resource organization's publications catalog and descriptive literature is necessary at the present time.

In sum, the organizational literature which RRS receives continually provides the source information needed to both profile organizational resources and identify specific outcomes for referral purposes. A subfile on educational meetings has been created, and although lengthy searching of the file contents is still necessary to identify other specific organizational outcomes, the possibility of creating additional subfiles has been considered.

Factors influencing computer feasibility. The fact that the file contents consist of data about organizations presents no problem. However, the diversity of data and multiple categories of organizational resources do influence the requirements for system design. Clearly it is not feasible to enter all of the organizational literature into a computer, so consideration must be given to decide which data elements should be cataloged, which fields should be searchable, and which levels or subfiles should be computerized. Decisions about file content will in turn affect the file size, internal processing procedures, future products and services, and of course the cost and allocation of personnel.

The resource organization profile forms provide a reasonably consistent base and structure for entering certain data fields into a computer; however, they were not designed as data preparation forms. They contain inconsistencies in several data fields, and utilize checklists and "see references" which are helpful when manually searching the file folders, but would be incomplete as "stand-alone" records in a computerized file. Narrative descriptions of specialized organizational activities and identification of appropriate contact persons may be necessary prior to computerization. In addition, since data on current publications and projects must be accessed manually under the present system, considerable efforts to create new subfiles would be required before the process of automating such manual techniques could be simulated. A more detailed discussion of these problems will be presented in Chapter V, Processing.

The subfile on educational meetings could be easily computerized with minimum modifications in current procedures.

Design Options

1. Organize file contents based upon current policies and procedures--i.e., data contained in resource organization profile forms and subfile on educational meetings.

2. Organize file contents based upon a revised resource organization profile form, and the present subfile on educational meetings.

3. Organize file contents based upon a revised resource organization profile form, the present subfile on educational meetings, and additional subfiles on organizational products and projects.

Discussion. Although the problems associated with using the current resource organization profile form have been discussed above, it would be possible to convert those data fields which are reasonably consistent to machine readable form. Design option number 1 has the advantage of relative ease and speed of implementation, but would provide only limited support of RRS products and services. As mentioned above the computerization of the Meetings Exchange card file could be easily accomplished as presently organized.

Design option number 2 confronts the need to revise the resource organization profile form, but continues the current policy of a single subfile on educational meetings. This represents a compromise design in that the revised form would provide greater consistency and completeness of data to support computerization, but stops short of creating additional subfiles on specific organizational products and projects. This design would permit a flexible or more gradual implementation of computer-based services. The major disadvantage would be the inability to simulate present referral procedures in an automated mode, and consequent reliance upon RRS staff for manual provision of this service.

The third design option attempts to organize the file contents in a manner which fully simulates the present resource identification and referral procedures. Considerable effort would be required to both revise the resource organization profile form and establish new subfiles on products and projects. Retrospective conversion of the present forms would be particularly time consuming. The advantage of this design is that it will not only support the computer-based production and dissemination of current RRS publications and services, but it will also permit the development of new resource information products.

The current procedures for developing the RRS database have been quite adequate in supporting a manually accessed resource and referral service. However, the resource organization profile forms were not designed to support a computer-based resource and referral system. This distinction is very important when assessing the feasibility of computerizing the present structure of the file contents. The need for consistency of data fields in computer searching and the need for completeness of data fields in producing computer-based publications would soon reveal the inadequacies of the present form and procedures. A system requires documentation which rationalizes and ensures the integrity of the file contents, whereas a custom service can function with minimum documentation and tolerate a wide variation in the preparation of file contents. This is not meant to imply that present procedures are not at all systematic; the argument is intended to highlight the limited degree of system characteristics, and the need for a high degree of system documentation and procedures to support a computer-based system. The benefits of a well designed computer-based information system will be demonstrated through increased access to services and products which would not have been possible through a manually accessed database at a central location.

Cost considerations and personnel requirements. A revision of the present resource organization profile form to capture more complete data in describing organizational resources would have the effect of increasing the costs of computerizing the database, as would the addition of new subfiles for products and projects. The costs of data entry, storage, and manipulation of the data would increase as a function of the file size. More importantly, the personnel required to retrospectively update the resource organization profile forms would require either the addition of temporary help at the Program Assistant level, or a reduction in user services to shift current staff responsiblities to acquisition and processing functions. The addition of subfiles on new products and projects could be performed by two half-time student assistants, based on RRS' experiences in producing the card file on educational meetings. Personnel costs for data entry would increase depending upon the time schedule for system implementation.

Recommendations. Design option number 3 is recommended. A decision to revise the current resource organization profile form, implement a retrospective conversion, and add subfiles on new products and projects represents a logical evolution of the RRS database. The advantages to be gained from a systematic structuring of data contents, and the automation of current referral procedures in identifying specific organizational outcomes, will become fully realized in later discussions of user products and services supported by this design option. For additional information about format requirements to structure the data contents of a computerized RRS database, the reader is referred to the chapter on Processing, and the sample forms presented in Appendix A.

This recommendation is contingent upon the larger decision to computerize the files for full subject search and retrieval. For example, design options number 1 or number 2 would be appropriate if funding limitations permitted, say, the conversion of only a limited subset of the file contents to machine readable form. Such a procedure might support the development of computer-based publications and search strategies implemented in a batch mode. A recommendation for design option number 3 is considered the best alternative, but it should be pointed out that recommendations made for each system function represent only one choice among a broad spectrum of system design possibilities.

This recommendation is especially critical, due to the impact which this decision will have upon the other system functions. In particular, the acquisition procedures for obtaining information from participating organizations, the personnel required to process new and revised records, the search and retrieval software, and the potential user audiences interested in direct access to the files will all be affected if this recommendation is fully accepted and implemented.

III. SELECTION

Present Policies

The criteria for including organizations in the RRS database are: (1) the resource organization must either produce or provide access to educational R&D-based resources; (2) organizational resources must be available nationally (highest priority), regionally, or at the state level; (3) the organization must be a nonprofit or not-for-profit organization.

Discussion. Although at the beginning of the RRS project priority was given to organizations involved in basic skills and competency-based education (primarily K-12), experience in responding to the diversity of information requests initiated by the Regional Exchanges made this limitation impractical. Moreover, a close inspection of the criteria currently employed reveals that considerable latitude in judging appropriateness for the database is possible, depending upon narrow or broad interpretations of the criteria by RRS staff.

For example, a narrow interpretation of the first selection criterion regarding production of or access to educational R&D-based resources would exclude the organizations listed in Table III. In fact, these organizations were included in the database because of their expertise in areas which RRS staff judged to be of interest to RDx clients. Table III represents only a sample of participating organizations which do not focus primarily on educational research and development. Typically these organizations have been included because they were referred to in responding to an information request. In some cases the organizations had been previously identified and rejected by RRS because they failed to meet the first selection criterion.

The second criterion requires that organizations make their resources available nationally, but leaves the door open for access at the regional or state levels. In practice very few state-level organizations have been selected, although many state-level organizations make their publications and R&D project results available nationwide. Many university-based research centers would also fall into this category, but to date no systematic effort has been made to include them.

The third criterion is straightforward, but even here professional judgment has found exceptions to the rule. For example, the Instructional Objectives Exchange is technically a for-profit organization, and so are many of the private R&D

Table III

SAMPLE RESOURCE ORGANIZATIONS IN RRS DATABASE WHICH DO NOT FOCUS ON EDUCATIONAL RESEARCH AND DEVELOPMENT

Resource Organizations	Reasons for Including in RRS Database
National Information Center on Educational Media; National Association of Educational Broadcasters; National Audio-visual Association.	Provide information pertinent to requests on educational media, technology, marketing, and dissemination.
National Center for Law and the Handicapped; American Coalition of Citizens with Disabilities; National Black Child Development Institute.	Advocacy organizations which monitor legislation, policies, and practices.
Grantsmanship Center; Responsive Procurement Exchange.	Provide access to funding sources for conducting educational research and development.
Social Problems Research Center; Academy for Contemporary Problems; American Society for Public Administration.	Offer resources which are occasionally targeted or adaptable for educational community.

organizations which conduct government funded grants and contracts. The publications, projects, and technical assistance available through these for-profit corporations have on several occasions been utilized in making referrals.

An additional problem in applying this third criterion is caused by the increasingly common practice of nonprofit organizations which arrange for commercial distribution of their R&D-based products. For referral purposes it is frequently necessary to have access to recent catalogs of commercially available products in order to quote prices, format descriptions, contact persons for additional assistance, etc. At the present time RRS must rely on descriptions provided by other organizations or call the commercial firm directly.

In general these selection criteria have provided useful guidelines in building the RRS files to date. However, questions have arisen when applying these criteria. The need for clarification prior to further file development efforts has been noted

by the RRS staff, and recommendations are needed regardless of the feasibility of computerizing the database.

Factors influencing computer feasibility. Selection criteria obviously influence the number of entries in the database. The present policies have resulted in a steady increase of organizations selected for the file, and this trend alone has been a primary justification for the current feasibility study. Efforts to apply a strict interpretation of the criteria will therefore lesson the need to computerize, and conversely modifications which allow the systematic identification of new resource organizations will increase the pressure to computerize.

Design Options

1. Continue Present policies; i.e., apply the criteria broadly and include some organizations which do not meet a strict interpretation of the criteria in order to make useful referrals when responding to information requests.

2. Clean up the database; i.e., eliminate those organizations which do not meet a strict application of the selection criteria.

3. Redefine the existing selection criteria to permit more systematic expansion of the database.

Discussion. The first option has the advantage of allowing flexibility in meeting the information needs of clients. The second option has the advantage of at least clarifying the scope of the database. However, it is the consensus of all RRS staff members that responses to information requests could be prepared more efficiently and at the level of detail needed by the end user if the selection policies were redefined to permit more comprehensive acquisitions. As the number of information requests have increased, RRS staff have been frustrated in the press to meet deadlines because it is so often necessary to call a new resource organization and either wait for the information to arrive by mail or take down the referral information over the phone. Some form of option number 3 designed to expand the scope of the database would therefore be likely to improve the turnaround time in responding to requests, and permit more specific referrals to resources for the end user.

Cost considerations and personnel requirements. The first option is likely to have only minimal impact on system costs and personnel; however, the gradual upward curve in resource organization acquisitions due to this "flexible" selection policy will eventually result in substantial costs through increased time allocated for processing functions. The second option will definitely minimize costs and reduce personnel requirements. If

strictly applied, it is doubtful whether there would be a need for computerizing the RRS database.

Design option number 3 could result in varying degrees of expansion of the current files. This would increase the costs of storing, manipulating, and processing data. Personnel requirements would also be increased in the areas of acquisitions, processing, and file maintenance, and adjustments would have to be made either to move staff away from competing tasks or to add new staff.

Recommendations. Design option number 3 is recommended. The following specific changes are suggested to maximize the usefulness of the files and minimize the costs of expanding the scope of the database. The first selection criterion should be modified by requiring that the "resource organization must produce or provide access to educational resources", thereby eliminating the phrase 'R&D-based'. This change will have the effect of sanctioning present policies, and encouraging the addition of some organizations which have previously been rejected or given low priority for processing. Changes in the remaining two criteria will insure that the amount of data collected on each organization will not grow in unmanageable proportions.

The second criterion should state simply: "organizational resources must be available nationally". This will insure that any user of the file will have access to the resources described. Note, however, that regional or state level resource organizations may be included in the database if they offer access to products, project information, or technical assistance on a national level. This restriction implies that RRS is responsible only for describing those resources which are available nationally, thereby limiting the amount of information collected on regional or state level organizations.

The third criterion should remain the same in order to avoid becoming a clearinghouse for commercial educational resources. However, to address some of the problems which have arisen in applying this criterion, RRS should not hesitate to acquire and maintain catalogs and literature from for-profit organizations in a separate, alphabetically arranged file to supplement referrals when necessary. In those instances where a nonprofit organization chooses to distribute a product commercially, an availability field should be included in the RRS cataloging format to permit the inclusion of name and address data for commercial firms.

The revised criteria are intended to make the files more responsive to user needs. The expected increase in the size of the database, coupled with the increase in size resulting from additional data contents, will be examined in more detail in the discussion of acquisition and processing functions.

IV. ACQUISITIONS

Present Policies

RRS employs a half-time librarian to systematically identify potential resource organizations and acquire their literature for processing into the database. The librarian's task of identifying new organizations through directories and newsletters is supplemented by staff who learn about new organizations in the course of responding to information requests and preparing Mini-Lists. The primary means of communicating with the new organization is through form letters designed to introduce the organization to RRS and RDx, and to solicit appropriate literature. A special brochure is also included to explain the benefits of participating in the database in greater detail.

Upon receipt of the organizational literature, the resource organization profile form is completed by RRS staff and then returned to the contact person at the organization for verification. After the verification procedure is completed and corrections are made, the organization is officially entered into the database for referral purposes.

At present 2,772 organizations have been identified using the above acquisition procedures. About 35% of these have been rejected by the selection criteria and nearly 500 have not yet been decided upon, leaving 1,255 organizations which have been contacted to request their participation in the database. Of the 657 organizations which actually sent materials to RRS, 550 have been fully processed into the files, and the remainder have not yet been cataloged. Table I on page 3 provides a graphic illustration of this data.

Very recently the RRS acquisition procedures were modified. A Graduate Research Associate has begun contacting by telephone those organizations which were previously contacted by mail and failed to send any literature. In addition, the half-time librarian has begun working 65%.

Discussion. The recent policy changes mentioned above were made in response to the problems evident from the number of organizations which have been contacted but for various reasons did not respond. Initial feedback on this procedure indicates that telephone contacts are resulting in near 100% response, excluding the roughly 10-15% which could not be reached.

Another problem area associated with current procedures concerns the relatively low priority given to acquisitions (and processing, once the organizational literature is received). The need for additional personnel allocated to these functions has been recognized, and the large number of organizations to be contacted or "in process" documents this need.

From the viewpoint of staff members responding to information requests, the slowness in acquiring organizational literature points up some additional difficulties with the present procedures. Reliance upon form letters often results in a one-shot mailing from the new organization, with few human resource contacts made and little new information received on a regular basis. Experience in telephone communications with staff members at participating resource organizations indicates that the human linkages established are more likely to yield a two-way sharing of information and, ultimately, better resource identification and referrals for clients.

Factors influencing computer feasibility. Acquisition procedures designed to narrow the gap between organizations identified and organizations actively participating in the database will of course increase the pressure to computerize as the file expands. But more importantly the acquisition function is critical for a database which is used to describe widely varying organizational resources and which must also be accurate and current for referral purposes. If this information is computerized, the effect is to publish the data for each end user of the database. Thorough and efficient acquisition procedures will therefore facilitate the processing, file maintenance and updating procedures required for a computerized system.

An acquisition policy which encourages active participation and involvement by members of the RRS database will also help in the development of subfiles to announce new products, projects, and meetings. Telephone communications result in greater awareness of RRS and RDx, thereby motivating contact persons at the resource organizations to send information about new resources in order to take advantage of announcement, exchange, and referral services.

In the course of telephone conversations, contact persons often ask for copies of RRS Mini-Lists and the Meetings Exchange. In several instances, these persons have subsequently sent RRS announcements of meetings in the same format as the Meetings Exchange entries. If a significant number of organziations were to assume this responsibility, such a procedure would dramatically reduce the time required to process incoming data. Again, communication and interaction with resource organization contact persons lead to the acquisition of information which supports the level of detail required for computerization.

By contrast, past RRS acquisition policies which relied upon the mailing of form letters have resulted in (1) a large backlog

of organizations with no literature acquired, (2) many "processed" organizations with incomplete data fields, and (3) no regular flow of new information to update old records. The key to successful computerization of the files will be linked closely to the success of implementing effective new acquisition policies.

Design Options

1. Continue present modified policies which rely upon mailing form letters to acquire literature, verification by a single key contact person at the resource organization, and use of telephone contacts to periodically clean-up the backlog of non-responsive organizations.

2. Develop a new acquisitions policy which relies primarily upon telephone contacts to acquire literature and obtain organizational information, including identification of multiple contact persons for accessing organizational resources.

Discussion. The present policies of design option number 1 must be considered in relation not only to the current backlog of prospective resource organizations, but also in relation to the earlier recommendations made regarding expansion of the contents and scope of the database. This option may be acceptable if earlier recommendations are rejected in favor of a more limited file development effort. However, it should be clear from past experiences that some form of the second design option will be required in order to support the efficient computerization of expanded file development activities.

Cost considerations and personnel requirements. The modification of current policies represented by design option number 1 has already caused a shift in the assignment of RRS personnel to support increased acquisition activities. Design option number 2 will result in an even more dramatic shift of personnel, and seen in relation to the earlier recommendations to expand data contents and broaden selection criteria, it is likely that an additional half-time professional will be needed to obtain the necessary organizational information by telephone. The preparation of documentation in the form of a resource identificiation manual to assist this person will be needed to insure consistency and provide a rationale for all information acquired.

Recommendations. Design option number 2 is recommended, with the following specific suggestions for implementation:

1. An additional half-time professional staff member should be hired to assume responsibility for telephone contacts with organizations participating in the database.

2. Documentation should be prepared to assist this staff member in obtaining consistent data and providing an appropriate rationale for data collection activities.

3. RRS staff members currently involved in providing user services should shift some of their present responsibilities in order to support the activities required to implement recommendations to expand the contents and scope of the database.

V. PROCESSING

Earlier discussions of the content and organization of the database, as well as the acquisition procedures for obtaining organizational information, have touched upon the processing functions to be analyzed below. The reader's familiarity with recommendations already made in those sections regarding revision of the resource organization profile form, creation of new subfiles on products and projects, and the use of telephone contacts to obtain and verify some of the information for processing will be assumed in this section. This procedure acknowledges the integral relationship between these and all the system functions which have been isolated for examination in this study, and will permit in this section a more detailed analysis of the processing requirements for specific data fields in the proposed new data record structure.

For purposes of discussion, a proposed three-level data record structure will be used as a reference point in analyzing the strengths and weaknesses of the present forms used in processing organizational resources. The current resource organization profile form, sample index card formats, and file status sheet are included in Appendix A, and the proposed new data record structure is presented in Appendix B. Comparisons will be made throughout the remainder of this chapter.

Level I on the new format, Organizational Overview, corresponds roughly to the front page of the current resource organization profile form. Level I data might be thought of as comparable to a bibliographic record, with descriptive cataloging data, an abstract, and ERIC descriptors (assigned under the "Major Areas of Emphasis" field on the current forms). Level II, General Organizational Resources, corresponds to the checklists on services and informational literature and the field for identifying key contact people found on the reverse side of the current resource organization profile form. Level II on the proposed Data Record Structure calls for a considerable expansion of information on organizational resources as compared with the present form.

Level III, Specific Organizational Resources, corresponds to the present subfile on educational meetings and to the very limited information processed under field number 16 on the resource organization profile form--"Available Products in Priority Areas." (A misleading title in that brief project or program descriptions have also been entered in this field, and not necessarily in priority areas.) Level III on the proposed

data record structure is also designed to create new subfiles on organizational products and projects similar to the existing file on educational meetings.

Present Policies

After organizational literature is acquired a decision is made to determine if selection criteria for the database are met. If so, an accession number is assigned and the resource organization profile form is completed. Normally an RRS staff member prepares the profile and the completed form is mailed to the resource organization for verification. Occasionally profiles are completed by the participating organization, and sometimes the verification is made by telephone contact.

A file status form is placed in each file, and used to monitor the dates of all communications with the resource organization. This form also tracks the use of each participating organization in responding to information requests and producing Mini-Lists. Finally, ERIC descriptors are listed on this form to provide access to organizational resources identified in publication lists and program or project descriptions.

Index cards are prepared for each descriptor assigned, and references to the resource organization's accession number and acronym are recorded. Extensive "see references" are maintained to direct the user of the files from similar ERIC descriptors to the one chosen for use in the RRS files. This procedure is designed to collapse the very large ERIC vocabulary available to a more manageable subset suitable for manual searching. Two additional card files on participating organizations are processed and cross referenced alphabetically and by accession number.

Information about educational meetings is normally obtained from newsletters and special announcements from participating organizations. A special card format is used to record appropriate data for referral purposes, and ERIC descriptors are assigned. This file is maintained separately from the main files described above.

Discussion. There are a number of problems associated with the resource organization profile forms which have been addressed in the proposed new data record structure. The new format is designed to improve current processing procedures and support a computerized database. A look at several of the "problem fields" on the present form will help clarify the scope of both retrospective and future activities required to implement the new data record structure.

Field number 3 on the current resource organization profile form, RRS Contacts and Positions, is useful for RRS but does not necessarily refer the end user to the appropriate contact at the

organization. The proposed form would limit this field by listing only the head of the organization and/or a designated public information officer. Field number 6, Sponsoring Organization, does not permit the proposed distinction between the affiliation(s) of an organization and the funding source(s) of the organization. Field number 9, Principal Clients, has been filled out on a case-by-case basis with no authority list or controlled vocabulary. A checklist would permit more systematic identification of client audiences, which would in turn make this field a useful access point in developing computer search strategies. Field number 11, Major Areas of Interest, has been completed using broad ERIC descriptors. In the proposed new form this field would be expanded to include both descriptors and identifiers. As these examples indicate, relatively minor changes on the first part of the resource organization profile form would be required to accommodate the Level I Overview of the proposed new format.

Fields 14 through 17 on the resource organization profile form provide useful information for completing the Level II General Organizational Resources section of the proposed data record structure. The checklists and brief one-line descriptions required in field 14, Services, and field 15, Informational Literature, cover reasonably well the proposed contents for describing Publications and Information Services and Training, Technical Assistance, and Consultation in the new format. The major difference lies in the proposed narrative presentation of more complete information in order to communicate more effectively to users who will not have immediate access to the source literature in RRS files.

Field 16 has been used inconsistently, but on the more recent profiles this space has been used to describe R&D-based products, programs and projects. For large organizations, this procedure results in the addition of one to three additional pages of annotated references. This information could easily be used to complete the brief narrative required for the Level II Research and Development Activities section of the proposed format; however, this information would more closely approximate the individual entries called for under the Level III subfiles for new products and projects.

Field 17, Key Contact People, has also been used very inconsistently on the present format, and has frequently been left blank. Under the proposed new data record structure, Level II General Organizational Resources would require the identification of all key contact people within each of the major resource categories. Considerable effort would be required to upgrade current processing procedures to accommodate the requirements for Level II of the proposed new format. Of course, not all organizations provide all three of the major cateogries of resources to be described. Still, converting retrospectively to a narrative and providing additional contact persons for even one of the three general resources represents a significant undertaking for a

small operation with limited staff. But the advantages of greater consistency and more complete information would be felt by users of the system who do not have immediate access to source documentation in the RRS files.

The present subfile on educational meetings corresponds to the proposed Level III subfile on meetings, and represents a prototype for the development of new subfiles on publications and projects. As mentioned above, the more recent resource organization profiles contain information in field number 16 which could be used for the proposed new Level III subfiles. However, the processing procedures used in developing the Meetings Exchange file would normally be employed for generating new subfiles. In this way information on publications and projects sent to RRS by participating organizations would be flagged and recorded on the appropriate card formats for either manual retrieval or entry into machine readable form for computer processing. This process applies primarily to new information, requires minimal verification, and would be stored for a relatively short period of time. Level III development efforts would therefore not involve large amounts of staff time compared to the work required for revision of the resource organization profile form and consequent retrospective upgrading of permanent file records which require verification and periodic updating.

Factors influencing computer feasibility. The problems of consistency and completeness of data processed using current procedures has been mentioned earlier. (See especially the section on Content and Organization.) Consistency in processing brought about by clear documentation procedures is necessary in order to fully exploit any information system, but especially those stored in machine readable form. Improving the consistency of selected data fields will be necessary if RRS is to effectively search the database from multiple access points and produce reference publications with multiple printed indexes. The benefits to be gained will depend upon the number of fields revised and the level of detail required by end users of the system.

The completeness of information provided, especially for users who do not have immediate access to organizational literature, is also important. Current processing procedures are often sketchy and incomplete, especially in describing general organizational resources. A narrative annotation describing major organizational divisions, areas of emphasis, target audiences served, and contact persons--as proposed in Level II of the new data record structure--would assist users in judging the relevance of organizations to their particular information needs.

The ability of the user to efficiently select potentially useful organizations is especially critical if an information system is to achieve credibility in the field. The problem of information overload, which can be attributed in part to the publishing of large quantities of references from educational databases, can be minimized if the system provides clearly

defined access points and sufficient information to describe organizational capabilities and limitations.

The quantity of data to be processed will influence the decision to computerize and the types of support services which could be performed more efficiently by machine assistance (e.g., publications, and batch or online searching). The relatively small number of fully processed resource organizations in the database would not necessarily justify conversion of the file contents to machine readable form. It is therefore necessary to examine the present and projected quantities of data which require processing to support RRS publications and services.

The majority of resource organization profile forms contain roughly 1,250 "character spaces" ready for input to the computer, or about half the length of a full ERIC abstract entry. The major exception would be recently prepared resource organization profile forms which contain annotated descriptions of products, projects, and programs averaging around 350 character spaces each. In addition, entries for the subfile on educational meetings typically contain about 500 character spaces.

The proposed data record structure would expand the contents of the resource organization profile form, particularly under the Level II General Organizational Resources section. This would result in an organizational description (Level I and II combined) equal to or somewhat longer than a full ERIC abstract entry of about 2,500+ character spaces. (This estimate assumes that not all organizations will require full Level II descriptions.) The proposed addition of two new subfiles to complement the Meetings Exchange file would add records of comparable length, i.e., approximately 500 character spaces per subfile entry.

Assuming further a modest projection of file growth to only 1,000 fully processed resource organizations over the next 1-2 year period, and a limited subfile development which adds only 10 highly current and topical entries per organization, the database would contain around 7,500,000 character spaces.

These figures are obviously based upon very crude approximations and projections for a database which attempts to monitor widely varying organizational resources. The figures at least provide some indication of data quantities broken down by levels of the proposed file structure, and should facilitate a more rational discussion of the decision to computerize all or part of the present processing procedures.

Design Options

1. Continue present processing procedures, but introduce greater consistency in completion of the resource organization profile form to accommodate Level I of the proposed data record structure.

2. Revise present processing procedures to accommodate the requirements of Level I and Level II of the proposed data record structure, and integrate the subfile on educational meetings.

3. Revise present processing procedures to fully adopt the proposed new data record structure.

Discussion. The first design option would permit computerization of the basic organizational overview to support the production of various directory-type publications. Retrospective changes could be held to a minimum, since most of the inconsistencies could be clarified during routine profile updates and through telephone contacts. The quantity of data would probably not justify an online search capability, but batch searching might be offered if necessary. The primary benefit would be more efficient production of publications.

The second design option would provide a more complete description of organizational capabilities, including the identification of human resources. In addition, the integration of the subfile on educational meetings would improve the efficiency of retrieving at least one category of specific resources. The production of more complete directory-type publications would be possible, and the increased utility of the files might well justify an online search capability. This option represents a significant effort to improve present RRS products and services, but would still require manual searching for references to specific publications and projects.

The third design option would permit the automation of current manual search procedures, and would support the production of a wide variety of resource publications. The specificity of resource identification would make online search capability very attractive, based upon feedback from users of the present search services. The announcement of new educational publications and R&D-based projects in addition to meetings would also be received favorably, based upon responses to the RRS Meetings Exchange from both practitioners and participating resource organizations.

This option would also result in high visibility for RDx because it would support the dissemination of information about R&D organizations and outcomes. In effect users of the system would be able to obtain custom search results similar to the contents of the present RRS Mini-Lists. The need for such a service is evident from the fact that over 100,000 Mini-Lists have been distributed, and the demand for new topics continues to surface faster than RRS staff can respond. A computerized RRS database would significantly alleviate this problem by allowing Regional Exchanges to provide this service and/or train state dissemination agencies to conduct the searches.

Cost considerations and personnel requirements. The first design option would require only a slight adjustment in the allocation of present staff to accommodate a modest retrospective updating of the present resource organization profile forms. In light of earlier recommendations for documentation to support the acquisitions function, the need for additional documentation to support specific processing functions would be minimal.

By contrast, the second option would involve a significant increase in staff time required to expand the data about general organizational resources to a narrative format which identifies contact persons and target audiences served. Such procedures would require a temporary shift in the allocation of present staff to support retrospective updating activities, and the addition of a half-time professional staff member to support the additional ongoing processing requirements.

The third option would require the additional personnel described above, plus two new student assistants for processing the two new subfiles on educational publications and projects. Depending upon the level of input and support from organizations participating in the database, only one additional student assistant may be required. There is already some evidence from publishing the Meetings Exchange that participating organizations will facilitate RRS processing requirements by providing information in the format required for data entry and eventual publication. A decision to limit RRS' role to selection and final editing of information initiated by participating resource organizations would significantly reduce staff time allocated to processing activities. It is anticipated that such a cost-saving procedure could be implemented after the publication became established.

Recommendations. Design option number 3 is recommended. This option is consistent with earlier recommendations made under the section on Content and Organization, and complements the recommendations for implementing new acquisitions procedures. The somewhat detailed discussion of processing requirements in relation to the proposed new data record structure was made in order to anticipate as clearly as possible the specific data fields and level of work required to support a computer-based RRS. However, this new data record structure, if implemented, could form the basis for development of all future RRS products and services, whether manual or computer-based. Final decisions will of course depend upon the allocation of funds to implement computerized support services.

VI. FILE MAINTENANCE

Present Policies

The present manual filing system has been briefly described under the Content and Organization section of this report. This section will explore file maintenance and updating policies in greater detail.

After an organization has been fully processed, the completed resource organization profile form is placed at the front of the hanging file folder which contains the organization's literature and brochures. Photocopies are also made and distributed to staff for use as a desk top reference notebook. The file status sheet used to track all communications and materials received from the participating resource organization is inserted alongside the organization's profile form. The file status sheet is used to maintain a continuous record of the number of times the organization has been used in responding to information requests and in preparing publications, and it is used to record all descriptors assigned after examining organizational literature. The completed 5 X 8 forms used in processing data about educational meetings are maintained as a separate subfile.

Updating of the main file is accomplished formally by sending an annual letter to participating organizations requesting that they update their profile form and send any new brochures or literature. Informally, since RRS is on the mailing list of most participating organizations, new information in the form of newsletters and organizational announcements is received continually. This results in a highly dynamic or changing file which is updated on a day to day basis to ensure the accuracy of referrals. Updating is sometimes required for the subfile on educational meetings, but due to the relatively short time period between the announcement and holding of a meeting the changes required are minimal. Meetings are periodically purged when proceedings have been published or the reference is no longer pertinent for referral purposes.

Discussion. Current file maintenance procedures are well organized and functionally designed to support a manual system which relies upon typing, filing, and updating based upon formal, written communications with organizations and the daily processing of new organizational literature. This system has begun to occupy an increasing amount of staff time as the files have grown and the increased visibility of RRS publications have stimulated the flow of information initiated by resource

organizations. The situation makes the management of the files an increasingly time-consuming task in that project resources which could be providing services must be assigned to file maintenance and processing activities. In addition, the size of the files makes it difficult to provide Regional Exchanges with access to comprehensive resource information so long as a manual system is operational.

The creation of subfiles on products and projects based upon adoption of the new data record structure would not appreciably affect the present file maintenance procedures. In time, however, the updating procedures would have to accommodate specific resource references. At present, descriptors assigned to the file status forms are simply added or deleted based upon examination of organizational literature. The annual updating of each profile form would have to include all subfile entries for verification, modification, or deletion.

Factors Influencing Computer Feasibility. The manual procedures used currently by RRS could be adapted to support the computerization of the files. More importantly, the increased time spent on file maintenance activities would begin to pay off in the sense that computer manipulation of the files would provide greatly improved access to the file contents for Regional Exchanges and their clients.

Assuming that present processing procedures were adapted, or the proposed data record structure were adopted, the file maintenance procedures now in place could simply be implemented using revised forms suitable for data entry. The present card files would continue to function as an authority list and a manual search and retrieval system until the file contents were fully converted to machine readable form. A computerized database could support new and more efficient means of generating specialized indexes and resource listings for file maintenance and updating functions. These indexes, and of course, new products and services made possible by computer typesetting and computer searching, would dramatically improve access to RRS by Regional Exchanges and their clients.

The availability of hardware and software resources to the RRS project will also affect the feasibility of plans for computerizing the database. The National Center for Research in Vocational Education currently leases a Texas Instruments Model 770 intelligent terminal which could be utilized by RRS for data entry. This terminal contains a microprocessor which permits the programming of custom data record formats and communication with a host computer. Data can be edited and stored on tape for later entry into the file in a batch mode, or data can be entered online. Given the cost-sharing benefits derived from maximum use of this terminal by two projects, in-house data entry would be very feasible. All new records could be added to the file in batch mode, and online entry could be limited to modifications or

changes in specific fields (telephone number, contact person, typographical errors, etc.).

Programming to design data entry forms, build and maintain a logical file, and produce routine sorts for monitoring database structure and contents could also be accomplished with resources available in-house. An Applications Programmer position for the Information and Field Services Division, which houses the RRS project, is open as this report is being written. TPL, a language similar to BASIC, is used to program directly on the data entry terminal; this language is user-oriented and after initial programs have been written the files could be maintained by RRS staff.

Generalized software packages designed to manage a variety of data files are accessible to RRS through OSU's Instruction and Research Computer Center. Use of such a prepared software package would minimize the need for original applications programming once the RRS data record format is defined and file loading programs are written. Discussions with systems analysts at Ohio State University indicate that Mark IV, which became available in June 1979, is particularly well suited to RRS management requirements. System 2000, a more powerful database management system currently used by other National Center projects, could also be made available. However, costs would be prohibitive for this package during the initial development phase. It may be considered at a later date if a demand for extensive resource tracking and internally-initiated file queries justify the higher costs.

Routine updating and maintenance of the master file, including batch or online data entry options, could be accomplished by RRS staff using OSU facilities at the Instruction and Research Computer Center. As part of the file maintenance function, tapes could be prepared in formats which would be acceptable to vendors providing computer support for RRS publications and information services. These would include vendors which employ computer typesetting techniques to produce camera-ready copy, including indexes, from database tapes; and vendors which provide computer search services, whether batch or online.

Other resources are available locally or nationally to enter and maintain RRS files in machine readable form. Keypuching services are available through the National Center for Research in Vocational Education, and of course keypunching, key to tape, or key to disk services are available through commercial vendors. Maintenance of the files could also be provided by a local service vendor, and at least one national search service vendor offers complete data entry and file maintenance services. These vendors also provide programming support for the software development required for RRS files.

Design Options

The present manual file maintenance system could be enhanced by any of the following design options for converting the files to machine readable form:

1. Enter and maintain file using in-house data entry equipment and OSU computer facilities.

2. Enter and maintain file using in-house and/or local vendor data entry equipment and local service vendor computer facilities.

3. Enter and maintain file using in-house data entry equipment and national vendor computer facilities of Bibliographic Retrieval Services, Inc. (BRS).

Discussion. The first option has the advantage of using OSU resources with well established channels for communication and accounting procedures for all required support services. The Texas Instruments Model 770 terminal is compatible with the IBM 370 computer, and support staff would be readily available for technical assistance. A potential problem might develop in scheduling jobs at the "end of the quarter" when demands upon the system are greatest due to a university setting and priorities. Care would have to be taken for example to avoid requesting a tape for producing the RRS Meetings Exchange at a time which might jeopardize the fast turnaround required to publish current announcements.

The first and second options both allow RRS staff to monitor locally all file maintenance activities, and of course no long-distance telephone communication costs would be incurred. The second option would take advantage of the numerous commercial firms in the Columbus area which provide data processing services. Any such contracted arrangement would be likely to provide reliable and timely service, but at a higher cost than university rates. If the data entry function were also contracted, this would relieve RRS from the responsibility of hiring and managing data entry personnel.

The third design option has become available recently from Bibliographic Retrieval Service, Inc. (BRS), a national search service vendor, as part of their efforts to provide full support services to customers who use their Private Database Service for online searching purposes. A microcomputer-based data collection system is available 22 hours per day to accept RRS records in either a batch or online mode. BRS would maintain and update the files as part of their routine procedures to provide online search accessibility, and they would provide programming support for preparation of specialized indexes and tapes to be sent to RRS and other vendors. A disadvantage of this option is the geographic distance from RRS, which would increase communication

costs and might affect the degree of control exercised by RRS management over file maintenance activities.

Cost considerations and personnel requirements. Most data entry and file maintenance activities involving computerization of the files represent add-on-costs, at least initially. Improvements in efficiency and effectiveness of file maintenance and delivery of services will not be felt until after 12 to 18 months of file building and debugging have been completed. Given the continuing service requirements and expectations of the RRS project, it is unlikely that much of the costs for computerizing per se could be absorbed by shifting present staff assignments.

The first design option could be implemented in a cost-effective manner by entering and storing records on cassette tapes at the Texas Instruments Model 770 terminal, and transferring this data to a master file stored on a computer tape reel. Assuming that disk storage is used only on those days when file maintenance and updating procedures are performed (as opposed to continuous daily rental of disk space), storage costs could be avoided entirely except for the cost of computer tapes at $14 per reel. Processing costs for loading file records on a disk and executing file maintenance programs would be minimal: approximately $5 to load a cassette with 200 records, and less than $20 total for the complete cassette to disk to master tape file update. Online updating of records in a time-sharing mode is relatively expensive (around $10 per hour), but use of the data entry terminal for batch updating would keep online modification of existing records (change of address, telephone, contact person) at a minimum. This procedure would cost around $1,000 during the first active year of file building. Certain fixed costs would also be incurred from rental of the data entry terminal (approximately $2,000 per year) and salary for one half-time data entry typist ($4,000). Costs for programming and system analyst support will vary depending upon whether original software is developed to support file maintenance routines or prepackaged software is used to manipulate the RRS database. The availability of resources within the National Center for Research in Vocational Education and Ohio State University's computing facilities would allow RRS to share costs with other projects and implement this design option for between $8,000 - $12,000. The variation in price is largely dependent upon the selection of software options.

Software to support file maintenance activities could be obtained in several ways. Development of new programs by either OSU staff or under subcontract arrangement would require 2-4 months of effort. The data entry terminal is equipped with a BASIC-like language which can generate procedural as well as forms programming. Depending upon the background and qualifications of the programmer assigned to this task, additional costs for consultation might be necessary. The total costs for implementing the first design option with original programming at the data entry terminal would be approximately $10,000 - $12,000.

Mark IV is a generalized file management system supported and available through OSU's Instruction and Research Computer Center as of June 1979. It appears to be an efficient package well suited to producing specialized reports and the maintenance of files containing well-defined records. The RRS database could be loaded for manipulation by Mark IV with minimum personnel costs for initial programming: 1-2 weeks would probably be sufficient. Total costs for implementing the first design option using Mark IV would be in the neighborhood of $8,000 - $9,000, assuming that further exploration of this software option confirms the initial estimate of suitability for the RRS database.

The second design option, which takes advantage of local data processing service bureaus, would cost considerably more than the first option. Keypunching/data entry costs charged by a commercial firm would be roughly comparable to the in-house procedures described above due to the sharing of costs between RRS and another project for lease of the "intelligent" data entry terminal. However, the computer processing, programming, and storage costs for maintaining and updating the RRS database would be significantly higher than OSU rates. Discussion with representatives from local vendors indicates that total costs (including fixed costs for data entry personnel and terminal rental) for implementing the second design option would range between $18,000 - $30,000. These estimates are probably somewhat high for the first year of file building when storage costs would be less. Costs increase depending upon the sophistication of the file management software employed and the requirements for additional programming to prepare special formats required by RRS or other vendors.

The third design option utilizes the private database service of Bibliographic Retrieval Services, Inc., a firm which specializes in managing bibliographic files. The costs for data entry and special programming for certain file maintenance routines are only slightly more expensive than the in-house procedures described under the first design option. However, since BRS is one of the three national vendors of online search and retrieval services, the additional costs of file loading, storage, updating, and searching required for file maintenance would not have to be duplicated if the decision is made to make RRS accessible through a national network. Specific costs are described under the Search and Retrieval Section of this report. A decision to select the third design option would therefore imply a commitment to selecting BRS as the national vendor for searching RRS, although of course selection of another file maintenance option would not exclude BRS as the national search service vendor. At present, the other national vendors do not offer a data collection system as part of their private database services.

Recommendations. Design option number one is recommended. The benefits from using in-house equipment and OSU computer facilities include not only the sharing of resources with other

projects to reduce costs, but also improved management of the database due to local proximity and control over all system functions and deliverable deadlines. To implement this design option, the following suggestions for software/programming support are recommended:

1. Organize and maintain the database using the Mark IV file management software package supported by OSU programming staff and facilities.

2. Train project staff member in the procedures required for updating the files and generating specialized indexes, reports, tape outputs, etc.

3. As a second choice, original programs could be written (by National Center staff or by subcontract arrangement) using the TPL language of the Texas Instruments Model 770 Intelligent Terminal. An RRS staff member would also have to be trained to execute these file maintenance programs.

VII. VOCABULARY DEVELOPMENT

Present Policies

RRS has used the ERIC thesaurus since the beginning of the project to index organizational resources. ERIC descriptors are also used for subject access to the subfile on educational meetings. Identifiers have also been assigned to provide additional access to the main profile entries and to the subfile on educational meetings.

Discussion. The rich diversity of ERIC descriptors has been more than adequate for selecting appropriate terms to describe organizational resources. In fact the present manual system has limited the full use of the ERIC thesaurus in several ways. Where many synonyms are available, a single "compromise" term has usually been chosen to simplify manual searching; cross-references are then made from the unused terms. Since coordination of descriptors is cumbersome in a manual system, terms representing educational level and format have generally not been employed. The use of identifiers has also been somewhat limited. Despite these limitations, the use of ERIC descriptors has proved to be useful due to the advantages of familiarity and compatibility when developing RRS searching strategies to supplement ERIC literature searches conducted by Regional Exchanges or their clients.

Factors influencing computer feasibility. The use of the ERIC thesaurus will facilitate the transition to a computerized system. The ERIC vocabulary is flexible and especially suitable for machine coordination of terms representing multiple access points. If the decision to computerize is made, some adjustments would be required by RRS staff. More synonymous descriptors representing finer shades of meaning could be assigned, and the use of format terms and descriptors for educational levels could be increased.

Although the format for describing organizational resources is different from the ERIC document-based format, the common controlled vocabulary results in a high degree of compatability from the client or user point of view. The software used currently by major national vendors permits easy searching between databases which share a common vocabulary, despite differences in the formatting of data elements. This benefits the user who must often search several related educational files such as ERIC (including RIE and CIJE), CEC, the Education Practice File, RRS, and state files which use the ERIC vocabulary.

Design Option

1. Continue use of the ERIC thesaurus in assigning descriptors to organizational resources.

Discussion. No other design options are contemplated.

Cost considerations and personnel requirement. No significant changes would be required.

Recommendations. Design option number one is recommended.

VIII. SEARCH AND RETRIEVAL

Present Policies

Manual searching of the RRS card file index is designed to retrieve the accession number of each resource organization which has been assigned descriptors used in the search strategy. The list of accession numbers must then be used to locate the title or name of the organization in a separate card file arranged sequentially. This two-step process has been shortened somewhat by introducing the practice of recording the acronym of the organization next to the accession number on each descriptor or identifier card. Very often the searcher is then able to go directly to the vertical file folders to locate the references to specific resources which prompted the original assignment of the descriptors.

Search and retrieval of references to educational meetings are also performed manually. ERIC descriptors and specific identifiers are assigned unique cards, and the accession number for individual meetings is posted on the cards. A two-digit prefix representing the month the meeting is to be held is included in the accession number, and this practice greatly facilitates the retrieval process. The RRS Meetings Exchange can be searched in a similar manner.

Discussion. The present manual system has become increasingly difficult to manipulate as the file has grown in size. Another difficulty is caused by the procedure which permits the assignment of descriptors to resource organizations without reference to the specific resource which prompted the assignment of the descriptor. This facilitates the general search process, but results in a significant time-delay for retrieval of the specific reference. Referral to the organization itself is too broad a reference to satisfy client needs. And perhaps most importantly, the need to implement search strategies based upon multiple access points is severely limited by a manual system.

The subfile on educational meetings provides a more efficient system for the search and retrieval of references, although coordination of terms remains cumbersome. This subfile is a prototype for the search and retrieval of specific references to organizational resources. The addition of subfiles on organizational products and projects as proposed in the new data record structure would greatly improve the efficiency of retrieving specific references for dissemination in response to information needs.

Factors influencing computer feasibility. The inefficiency of the present manual search and retrieval system can be improved through the addition of subfiles on specific organizational resources. However, the steady growth of the files makes even this procedure a time-consuming task. The inability to coordinate terms, in conjunction with file growth, indicates the need for a computerized system to provide efficient access to the database.

Optical coincidence systems which utilize a light box and specially prepared descriptor cards, and McBee cards which utilize a needle-sort technique represent two cost-effective alternatives to computerization which permit manual coordination of terms. However, the size of the controlled vocabulary employed, the potential number of records in the database, updating requirements, and the hierarchical structure of the resources cataloged make these systems impractical. In addition, these systems are designed as search and retrieval systems only, whereas records in machine-readable format also can be used for generating publications from the database.

Design Options

1. Continue manual search and retrieval of file contents, but with addition of subfiles based upon level III of the proposed new data record structure.

2. Provide batch search and retrieval of references based upon computerized files.

3. Provide online search and retrieval of references based upon a computerized file accessible through a national vendor.

Discussion. The first option has the advantage of providing some improvement of search and retrieval efficiency. It would also support responses to information requests and the manual preparation of publications based upon new product and project announcements.

The second option assumes that the database has been converted to machine readable form. This technique might be a cost-effective means of responding to the increasing number of information requests processed by RRS staff. Batch searching would also provide the opportunity to test the feasibility and utility of computerized search and retrieval of RRS files prior to any commitment of direct online access to the database by Regional Exchanges and their clients. Disadvantages would include a two-week turnaround time between receipt of request and delivery of response, access limited to a central location, and of course there would be no opportunity for interactive searching. This option is available through OSU's Mechanized Information Center.

The third design option would permit a full test of the usefulness of RRS files in responding to requests for assistance through organizational resources. The major national vendors are capable of loading the files for online, interactive, full text search and retrieval of the file contents. This option has become more feasible in recent years because the vendors now offer nationwide access to smaller files on a private basis which limits access only to users specified by the database producer. This would permit a pilot phase within the RDx network and allow a gradual evolution toward wider accessibility to RDx clients.

Cost Considerations and personnel requirements. The continuation of manual search and retrieval techniques with the addition of new subfiles to facilitate access to database contents would involve minimal costs, although personnel would be required to develop the subfiles as discussed under the section on Processing.

The costs for preparing and mounting a computer tape of the RRS database for batch search and retrieval of references would also be very modest. The software used by OSU's Mechanized Information Center (MIC) has been used to search ERIC, Scisearch, Social Scisearch, and other databses for many years. The costs for searching these tapes is only $2 per search, and assuming reasonable volumes of around 20 searches per batch run, the costs for searching RRS tapes would be comparable. The software could be made available at no cost, and no additional personnel would be required. This assumes that RRS would prepare and format the tape through routine file maintenance at OSU's Instruction and Research Computing Center prior to processing by MIC staff. Additional details regarding this service are provided in Appendix C.

The third design option, online search and retrieval through a national vendor, would involve significant additional costs and personnel requirements. Costs for initial loading of the file, storage, updating, maintenance, connect-time, communication, and off-line printing are presented for three national vendors in Table IV.

Initially, RRS would provide search services and absorb all costs incurred by those Regional Exchanges who wish to search the files directly. As usage increases, Regional Exchanges and/or their clients would be expected to pay for connect-time, communication, and off-line printing costs. At the same time, search and retrieval costs can be expected to decrease due to volume discounts made available by the vendors. A brief description of the private database services is included in Appendix C.

Lease or purchase of a portable terminal for RRS staff would also be required for online search and retrieval. Costs for training and updating of search skills for staff members may also be incurred, depending on the vendor selected and staff capabilities.

Table IV

COMPARISON OF COSTS FOR ONLINE SEARCH AND RETRIEVAL THROUGH NATIONAL VENDORS

Vendor	Load File	Storage	Update	Maintenance
BRS	$1000	$12 per million characters/month No minimum	$100	-------
Lockheed	$2000	$25 per million characters/month $200 minimum	$200	-------
SDC	$2000	$25 per million characters/month $50 minimum	$100	$150 per month

Vendor	Connect Time	Communication/ Telephone	Off-line Printing*
BRS	$16/hour	$5/hour Telenet $8/hour Tyment	$0.16/page
Lockheed	$35/hour	same	$0.10/citation
SDC	$35/hour	same	$0.10/citation

*Given the average length of RRS records, costs for off-line printing would be roughly similar for each vendor.

The availability of the RRS database as a private file may also involve RRS staff in providing specialized training in search and retrieval techniques unique to the RRS database. The costs for such training and allocation of staff time to prepare documentation and conduct training sessions would be offset in part at least by the increased capacity of Regional Exchange Staff to identify resources for client information needs. This capacity could be viewed as a cost benefit associated with the online design option.

Recommendations. Design option number three is recommedned in order to fully test the feasibility of using a database of organizational resources to respond to information requests. In order to implement this recommendation one of the three major vendors will have to be selected. According to cost data submitted thus far BRS would be the least expensive alternative. However, final selection of a vendor for the search and retrieval function would be made only after formal procurement procedures have considered all factors which bear upon the success of this system function.

IX. USER PRODUCTS AND SERVICES

Present Policies

RRS currently produces several publications and responds to information requests based upon the contents of the database. These include:

1. A series of Mini-Lists, each containing 8-15 references to organizations with resources available on a high-interest topic.

2. A Meetings Exchange, which announces workshops, seminars, and conferences.

3. Selected catalogs, such as Databases and Clearinghouses: Information Resources for Education and Human Resource Directories & Files in Education.

4. Custom responses to information requests consisting of letters and/or annotated lists of resource organizations.

Each product or information response is prepared and edited manually, although Mini-Lists are now being typed on word processing equipment to facilitate the production of camera-ready copy from tape.

Only the Meetings Exchange is produced directly from records which have been processed into the database. The Mini-Lists and Catalogs, as well as responses to information requests, are developed from custom formats designed to accommodate the specific type of resources being cataloged or described. In other words, the present resource organization profile form is not simply copied or modified to prepare Mini-Lists or special catalogs; new formats have been devised.

RRS user products and services are disseminated primarily through the Regional Exchanges and secondarily to the organizations which participate in the database. Although the quantity of products and the number of requests processed has been limited, a steady increase in demand for these products and services has been experienced. This increase has occurred even though dissemination of publications has been basically reactive, and the local-intermediate-state-regional filtering mechanisms have often limited RRS information services to a "court of last resort" role when other search services have been unsuccessful.

In sum, RRS publications and services appear to be well received by a small but growing audience of educators as a result of present dissemination policies.

Discussion. User products and services represent the outcomes generated by all the procedures used in acquiring, processing, and maintaining the database. Improvements in the system upon which user products and services are based will naturally benefit future product development and service delivery. However, present policies have tended to give top priority to the development of user products and the delivery of information services at the expense of systematic procedures for database development and refinement. This policy has limited the capacity of RRS staff to develop new products without acquiring new information and developing new formats, or to process more efficiently the increased number of information requests.

Specific examples of the difficulties caused by present policies include:

1. Much staff time is spent on the telephone acquiring organizational information in order to produce Mini-Lists and respond to information requests because database files are incomplete.

2. Production of the Meetings Exchange and revision of the Databases and Clearinghouses catalog require increasing amounts of time due to the manual manipulation and indexing requirements for ever larger quantities of data.

3. Responses to information requests must be customized because specific references to new products and projects have not been cataloged. To meet increased demand staff must often respond to clients by telephone only and eliminate time consuming (but use ful) written documentation.

4. Development of new products, such as maxi-lists on broad topics, specialized catalogs, or a comprehensive organizational directory, cannot keep pace with demand due to the staff time required to produce them.

It has become increasingly evident as the RRS project has matured that further development of user products and services will depend heavily upon the efficiency of the underlying system for organizing the database.

Factors influencing computer feasibility. The circumstances described immediately above provide a strong mandate to develop

and refine the RRS database in order to meet the increased demand for user products and services. Adoption of the proposed new data record structure and/or conversion of the database to machine readable form provide the means to a potential solution for many of the problems discussed.

For example, adoption of the new data record structure would not only pave the way for future computerization, but it would facilitate the production of Mini-Lists and speed the preparation of custom responses to information requests. Photocopies of specific resources cataloged in the subfiles on products and projects could be sent to clients in lieu of the present system of writing unique annotations each time a referral is made.

Computerizing the database would present additional opportunities to improve the efficiency and quality of both publications and information services. Arrangements with a computer typesetting firm could be made to prepare camera ready copy in any format required. The advantage of such an arrangement would be that camera ready indexes for each publication could be generated automatically by the computer. This procedure would also allow great flexibility in the production of new publications.

An Amtext 425 word processing unit, used currently by RRS in producing Mini-Lists and reports, could be upgraded to permit communication with computing facilities. This offers unique capabilities for production of publications designed for limited distribution. Camera ready "paper masters" can be produced for virtually any subset of database records in a preprogrammed format designed on the Amtext microcomputer. Such a procedure would allow increased dissemination of database contents without a commitment to computer typesetting programs or sophisticated search and retrieval programs. Specialized catalogs could be published and supplemented regularly using this process.

Computerizing the database in conjunction with the selection of an appropriate search and retrieval program would assist in the provision of custom responses to information requests. File maintenance programs alone would be useful in printing out large subsets of the file to facilitate manual searching. Batch searching via the Mechanized Information Center at OSU would represent a second level of search service, and selection of a national vendor would permit online interactive searching of the full text of the database. In addition, a national vendor would allow each Research and Development Exchange component and other designated agencies to search the database directly, thereby greatly reducing the demand on RRS staff to provide custom search services. It should be noted, however, that when computer searches do not provide appropriate references, RRS staff could still be available for backup support in responding to such "problem" requests.

Design Options

1. Develop and disseminate user products and services using manual procedures based upon the new data record structure.

2. Develop and disseminate user products and services based upon computerized database and OSU facilities and equipment.

3. Develop and disseminate user products and services based upon computerized database and vendors for both computer typeset publications and online interactive information search services.

Discussion. The first design option represents a first step in responding to the need for more efficient product development and processing of information requests. It would also permit the manual production of new publications based upon the new subfiles on products and projects called for in the new data record structure. It would not address the problems associated with a manually based filing system. Production of publications, particularly comprehensive resource listings, and manual subject searching on the multiple indexes would continue to be very time-consuming tasks.

The second option offers a compromise design which includes computerization but relies exclusively on in-house support of publications and information services. This option would provide for machine-assisted publication of Mini-Lists and catalogs through a microcomputer-based word processing unit, and batch search services through the Mechanized Information Center. These procedures would permit significant improvements in the efficiency of developing and disseminating user products and services. Disadvantages would include the relative difficulty of producing indexes for publications based upon subfiles or large subsets of the main files, and the lack of flexibility associated with batch search services originating from a central location.

The third design option is responsive to virtually all of the problems described under the discussion of present policies for user products and services. Maximum efficiency in supporting both current and new publications would be achieved through a computer typesetting process. Full use of RRS information services could be realized by a decentralized network of regional and state agencies tying into a national computer search service vendor.

Cost considerations and personnel requirements. The first option, as described in previous sections, would involve the addition of two student assistants assigned to process the additional data fields and subfiles required by the new data record structure, and assumes a shift of emphasis among present staff from user product and service delivery to acquisition, processing

and file maintenance activities. Therefore the major costs for development and dissemination of user products and services under this design option would be absorbed by these other system functions. Cost considerations specific to this system function include development of potential new products based upon new subfiles, and cost benefits realized from more efficent preparation of responses to information requests. The other design options assume adoption of the new data record structure prior to computerization.

The second option represents a relatively inexpensive design which takes advantage of OSU word processing equipment and data processing facilities. (The costs of computerizing the database, assumed under this and the following options, are discussed under the section on file maintenance.) Since the data entry function will probably use OSU's Instruction and Research Computer Center, a communication system must be devised to interface the National Center's word processing unit with OSU's computer facilities to support RRS' publications program. The only additional costs incurred would be for the lease of an acoustic coupler and the addition of a modular communication board for the word processing unit. Additional staff would not be required because present secretarial staff are already being trained to operate the word processing unit in conjunction with the preparation of Mini-Lists.

Limited computer-based search services could be supported under this option through the use of file maintenance programs to generate specialized indexes and reports based upon topical subsets of the database. Larger volumes of requests could be handled through OSU's Mechanized Information Center (MIC), which offers batch, key word searching of bibliographic databases at low cost. (See also the discussion under the search and retrieval section, and the letter from the MIC director in Appendix C.) This design option would require no additional personnel and very limited add-on costs due to the use of university resources available to the RRS project.

The third design option does require significant additional costs involving subcontract arrangements with two separate vendors. Costs for producing computer typeset copy for publications would include start-up costs to write initial programs to generate the required output formats ($1,000 -$2,000), and costs per camera-ready page for each publication ($8 - $10, reduced after volume increases). Realistically, some additional programming costs may be necessary as modifications in the format are dictated by user feedback. The per-page costs can be very cost-effective due to the number of citations or references which can be placed on each page compared with typewritten publications. In addition, clerical work is virtually eliminated, along with the time-consuming task of manually producing indexes.

Costs for providing online computer search services are described in the section on search and retrieval systems. Although some additional staff may be required to process online search requests, it is anticipated that many RRS clients will participate directly in providing these search services. Costs for searching, after an initial free introductory period while the database is growing, would be absorbed by the Regional Exchanges and their clients. Costs for training in the use of the database, and the lease of a portable computer terminal for demonstration purposes, would be provided by RRS.

Total costs for developing and disseminating user products and services depends also upon the factors of supply and demand. The demand for some RRS publications has already exceeded the supply due to printing, budget, and staffing limitations. New publications may be developed, and new search services may be offered which RRS staff many not be able to supply in sufficient quantities to meet user needs. Therefore an important cost consideration would be the establishment of procedures to recover some of the costs of product and service development. It would not be realistic to expect that significant revenues could be generated within the first year. However, given the potential of future income which might be generated by the RRS project, it is possible to speculate that over time some percentage of the RRS budget now used to build and maintain the database could be supplied from royalties received from the sale of database products and search services.

Recommendations. Design option number three is recommended. This is consistent with earlier analyses of system functions which indicate that the RRS database has matured to the point where further systematic development will begin to produce products and services which are broadly responsive to the information needs of educators. A strong commitment to the development and dissemination of present and projected products and services, as represented by this design option, will complement and reinforce earlier recommendations to refine and improve the procedures for building and maintaining the database.

This design option permits the potential for development of high quality publications and the accessibility of database contents nationwide. As part of the strategy for implementing this design option, it is suggested that RRS solicit advice and consultation from the RDx Coordinating Group and other individuals and agencies regarding the dissemination of user products and services to all appropriate audiences. Procedures for implementing cost recovery mechanisms should be explored, and special efforts should be made to assist potential users in the effective use of database products and services. The communication and training processes involved in this latter task should be consistent with the principles of dissemination as used in the adoption of other new educational resources.

X. SUMMARY OF RECOMMENDATIONS AND IMPLICATIONS FOR FUTURE DATABASE DEVELOPMENT

This report has analyzed RRS file development efforts by examining separately each of the major system functions which would be affected by a decision to computerize the database. In each chapter specific themes have emerged and pertinent issues have been discussed to assist those who will be making decisions about future database developments at RRS. Although specific recommendations have been made, ample flexibility remains to permit alternative system designs. These alternatives range from continuation of the present manual system with modifications in the data record structure to computerized system designs characterized by a variety of hardware and software options. However, the summary which follows and the projections for implementing a computerized RRS database are limited to the design options recommended in the body of the report.

Content and Organization. Present file contents on organizational resources were discussed, with particular emphasis upon the structure and organization of the files for purposes of resource identification and referrel services. (The relationship between RRS and other information systems was addressed as background information for this study in the Introduction). A recommendation to organize file contents based upon a revised resource organization profile form and new subfiles on organizational products and projects to supplement the present subfile on educational meetings was made. This recommendation was made in order to: (1) improve the consistency and completeness of data fields to support potential computerization, and (2) improve present procedures for identifying specific organizational resources for referral purposes.

Selection. The steady expansion of the database has been a primary reason for conducting this computer feasibility study. Confusion over how to implement present selection policies was discussed, along with the need for a more comprehensive database to respond to the kinds of information requests received. A recommendation to redefine the existing selection criteria to permit more systematic expansion of the database was made. Specific suggestions for redefining the present criteria were included.

Acquisitions. The timely acquisition of comprehensive organizational resource information is essential for the long term success of the RRS project. The present policy of relying upon written correspondence and the mailing of brochures to

obtain this information has achieved only limited success. Many potential organizations failed to respond, and few human resource contacts were made in order to ensure a steady flow of updated information. Recently, a modified policy has been implemented to permit the use of telephone contacts by RRS staff to verbally introduce the Research and Development Exchange and request organizational information. The success of this experience prompted the recommendation to develop a new acquisitions policy based primarily upon telephone contacts. Such a policy will require the addition of a half-time professional staff member, documentation of interview procedures, and a shift of some present staff time from responding to information requests to acquisition activities. Benefits will include the identification of multiple contact persons and a higher percentage of organizations which participate actively through a regular exchange of resource information.

Processing. This section analyzed in detail the present resource organization profile form in relation to a new data record structure proposed in Appendix B. A recommendation to revise present processing procedures to fully adopt this new data record structure was made. The rationale for a new data record structure was presented in the section on Content and Organization, but the specific requirements for implementing new processing procedures are outlined in this section. Projections based upon the anticipated size of the database are presented to help determine the quantity of information to be processed.

File Maintenance. The ready availability of OSU resources to support the automation of information systems was a significant factor in the recommendations for file maintenance functions. Specifically, data entry using a Texas Instruments Model 770 terminal and file maintenance and updating through OSU's Instruction and Research Computer Center were recommended. Software to support this system would also be available in-house; Mark IV, a file management system provided by OSU's computer facilities, was specifically recommended.

Vocabulary Development. To ensure compatibility of terminology with ERIC and related files, a recommendation to continue use of the ERIC thesaurus was made. This policy will benefit the increasing number of users who request information searches of multiple databases such as ERIC, Exceptional Child Education Resources, the Education Practice File, individual state files, and the RRS database.

Search and Retrieval. After discussion of a variety of techniques and systems, a recommendation to provide online search and retrieval through a national vendor of computerized databases was recommended. This option is increasingly available for even small files due to the relatively inexpensive private database services now offered by each of the major vendors. Anticipated benefits include direct access to the files by RRS

staff as well as designated users such as Regional Exchanges and other interested organizations.

User Products and Services. This final section examines the procedures used in developing and disseminating RRS products and services. To improve efficiency and timeliness in the delivery of resource information produced from database files, a computer-based system is recommended. The use of vendors for generating computer typeset publications and providing online interactive search services is also explored and recommended. In addition, procedures for disseminating RRS products and services to audiences beyond the immediate Regional Exchange clientele are considered. The need for long range planning and establishment of cost recovery mechanisms is also suggested.

Figure 2 represents a projected timeline for implementing the cluster of tasks and activities recommended for computerizing the RRS database. An 18-month period is divided into three, six-month segments. Activities in the first period are concentrated on the retrospective conversion of the database to the new data record structure, programming to load a test file, and selection of vendors for search services and computer typesetting. The second period is a test mode phase in which the major vendors for online searching and computer typesetting will receive RRS database tapes and begin generating computer-based services and products. The third phase will be characterized by full operational status, initial training efforts with three Regional Exchanges, and completion of the retrospective conversion to a new data record structure.

The costs involved in computerizing the RRS database, excluding personnel, have been estimated in Table V. The costs for online searching have been estimated according to figures supplied by BRS; however, as discussed in the chapter on search and retrieval systems, another vendor might ultimately be selected if variables other than cost result in another choice for this service. Programming requirements for initial loading of the file at both the OSU computing facility and the national search service vendor, as well as programming of custom output formats for camera ready subsets of the database, represent one-time costs which will require minimum support and modification in subsequent years of operation. In addition, per page costs for computer typesetting may be reduced as the volume of camera ready copy increases to support a growing publications program.

Additional personnel will also be required to implement the recommendations for a computerized RRS database. The resource librarian, currently employed 65% on the project, will either have to become a full time position or an additional half-time program assistant will be needed to meet the increased acquisition and processing requirements. Two additional student assistants will be required to process the two new subfiles on organizational products and projects, and one of the two graduate

FIGURE 2: TIMELINE FOR IMPLEMENTING SELECTED TASKS REQUIRED TO COMPUTERIZE RRS DATABASE

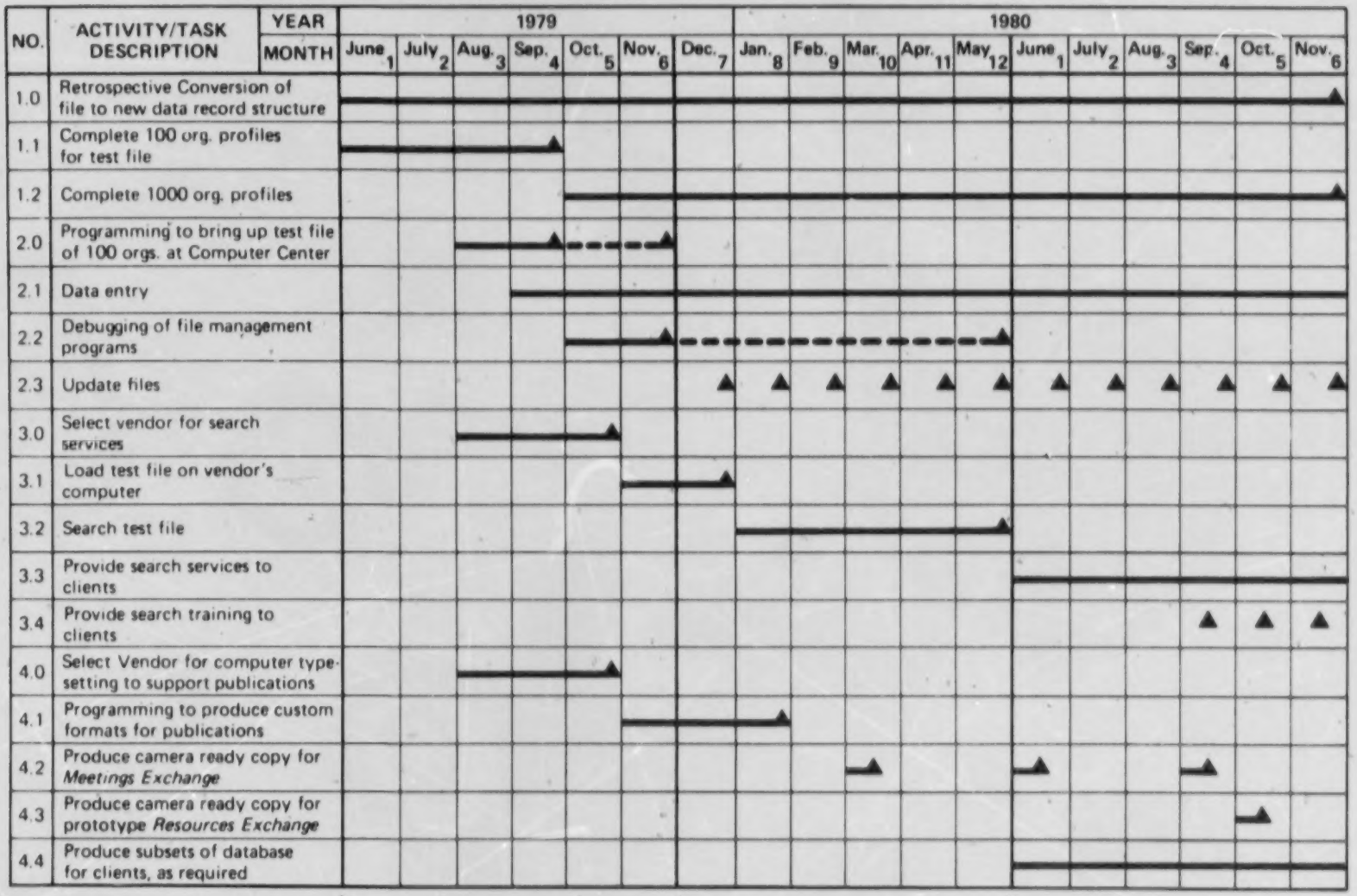

NO.
ACTIVITY/TASK DESCRIPTION
YEAR
MONTH
1979
1980
June 1
July 2
Aug. 3
Sep. 4
Oct. 5
Nov. 6
Dec. 7
Jan. 8
Feb. 9
Mar. 10
Apr. 11
May 12
June 1
July 2
Aug. 3
Sep. 4
Oct. 5
Nov. 6
1.0 Retrospective Conversion of file to new data record structure
1.1 Complete 100 org. profiles for test file
1.2 Complete 1000 org. profiles
2.0 Programming to bring up test file of 100 orgs. at Computer Center
2.1 Data entry
2.2 Debugging of file management programs
2.3 Update files
3.0 Select vendor for search services
3.1 Load test file on vendor's computer
3.2 Search test file
3.3 Provide search services to clients
3.4 Provide search training to clients
4.0 Select Vendor for computer type-setting to support publications
4.1 Programming to produce custom formats for publications
4.2 Produce camera ready copy for Meetings Exchange
4.3 Produce camera ready copy for prototype Resources Exchange
4.4 Produce subsets of database for clients, as required
Last 1/3 of Present 18-Month Grant Period
Database in Test Mode
Database Operational

Table V: Estimated First-Year Costs for Programming, Equipment, and Data Processing Required to Computerize the RRS Database

Recommended System Requirements	Cost
*File management programming/system consultants	$ 2,000
Data entry terminal rental	2,000
Data entry/file updating and processing	1,000
Total file maintenance costs at OSU facility	$ 5,000
*Programming for initial file load/online searching	$ 1,000
Portable terminal rental for searching	1,200
Storage	1,200
File updating	1,200
Search and Retrieval	
Connect-time	2,500
Communication costs	750
Prints	500
Total costs for online search services	$ 8,350
*Programming by computer typesetting vendor for custom output formats	$ 2,000
Camera-ready copy for *Meetings Exchange* (3 issues)	1,200
Camera-ready copy for prototype *Resource Exchange* (1 issue)	400
Camera-ready copy for miscellaneous subsets of the database upon request	1,000
Total costs for computer typesetting service	$ 4,600
Total Costs	$ 12,950

*Programming costs represent one-time costs during first year of operation.

students currently responding to information requests should be assigned to acquisition and processing activities. A half-time data entry typist will be needed to enter, check, and change records at the computer terminal.

Due to the increased typing required by the expanded format of the data record structure, the clerical staff will require an additional half-time typist. To support the requirements for computer searching and training of Regional Exchange personnel, an additional librarian/searcher should be assigned to the project at 25% F.T.E. Finally, consultants may be required on occasion to assist project staff in analyzing system functions. This assistance could range from technical data processing problems to strategies for marketing and dissemination of database products and services.

Considerable progress has been made by the RRS project in the relatively short period of time since becoming operational as part of the Research and Development Exchange. Products and services have achieved acceptance in the field and given visibility to the mission of the RDx. Hundreds of organizations are beginning to participate actively in the RRS database through a regular exchange of resource information. An information service specifically designed to support the dissemination of organizational resources has matured into a system which can complement and reinforce related educational information systems. If the recommendations in this report are adopted, the resulting accessibility of database contents to a much wider audience will contribute to the ultimate goal of helping practitioners find and use the necessary resources to improve educational practice.

Appendix A

RRS Forms Used in Processing Organizational Resource Information

The following forms are included:

1. Resource Organization Profile Sheet
2. File Status Sheet
3. Meetings Exchange Card File Record
4. Sample Index Card Formats

RESOURCE ORGANIZATION PROFILE

PRIORITY
2. TOPICS:

3. RRS CONTACT(S) AND POSITION(S):

4. NAME OF ORGANIZATION/PROJECT:

5. ADDRESS:

6. SPONSORING ORGANIZATION:

7. PHONE:

8. TYPE OF ORGANIZATION:

9. PRINCIPAL CLIENT(S):

10. STAFF/MEMBERSHIP SIZE:

11. MAJOR AREA(S) OF EMPHASIS:

12. ABSTRACT:

13. FOUNDED

RETURN TO: Ms. Kacey Obremski, Resource and Referral Service, National Center for Research in Vocational Education, Ohio State University, 1960 Kenny Road, Columbus, OH 43210

14. SERVICES: (Check and describe all that apply.):

___ Information Searches (___Computerized ___Manual) _____

___ Technical Assistance _____

___ Resource Center _____

___ Workshops/Seminars _____

___ Conventions _____

___ Publishing _____

___ Other _____

15. INFORMATIONAL LITERATURE (Check and describe all that apply.):

___ Newsletter _____

___ Serial Publication(s) _____

___ Publications Catalog _____

___ Product Brochure(s) _____

___ Annual Report(s) _____

___ Organization Brochure(s) _____

___ Personnel Directory _____

___ Bibliographies _____

___ Other _____

16. AVAILABLE PRODUCTS IN PRIORITY AREA(S): (Provide title, author, sentence description, date, number of pages, cost, ordering information, and/or ED number.)

17. KEY CONTACT PEOPLE: (provide name, title, and area of responsibility or specialty).

18. SOURCE:

19. PERSON COMPLETING FORM: _____ Position: _____ Date: _____

20. ORGANIZATIONAL PROFILE VERIFIED BY: _____ Date: _____

FILE STATUS RO_____

Date

_____ Form letter #___ sent as initial contact

_____ External inquiry

_____ Phone call is initial contact

_____ During phone call, materials are asked for

_____ Materials in response to form letter received

_____ Materials in response to phone call received

_____ Unsolicited materials received

_____ Number assigned

_____ Mailing List Card made

_____ Resource Organization Profile form completed by RRS staff

_____ Blank profile mailed to organization

_____ Profile completed by organization and received by us

_____ Phone verification of profile information

_____ Form letter #5 sent with completed profile and stamped self-addressed envelope

_____ Verified profile received from organization

_____ Retype profile

Log _____

_____ Descriptor/s_____

Mini-List_____ _____

Publication ordered_____ _____

MEETINGS EXCHANGE CARD FILE RECORD

No. _____ National? _____ Date(s): _____
Regional? _____
State: _____

Title: _____

_____

Descriptors: _____

_____

Identifiers: _____

Target Audience: _____

Location: _____ Invitation only? _____

Sponsor Org.: _____ RO _____

Contact: _____ Reg. Deadline: _____

Telephone: (_____) _____ Reg. Fee: _____

Paper submission deadline: _____

Source of info: _____ Agenda available: _____

_____ Agenda received: _____

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Accession Number Entry (Pink)

RO 000 009

National Committee for Citizens in Education (NCCE)
Suite 410, Wilde Lake Village Green
Columbia, MD 21044
(301) 997-9300
Bill Rioux, Senior Associate

Alphabetical Entry (White)

National Committee for Citizens in Education (NCCE)

RO 000 009

Acronym Entry (White)

NCCE

see

National Committee for Citizens in Education

RO 000 009

Eric Descriptor Entry

Citizen Participation

R0 000 009 (NCCE)
R0 000 007 (IRE)
R0 000 199 (CNS)
R0 000 271 (NSVP)
Log 121
R0 000 329 - MCCE
Log 185
Log 192
R0 000 357 (CCEO)

(Blue)

Identifier Entry

Public Law 93-112, Section 503 (Rehabilitation Act of 1973

R0 000 390 - MAINSTREAM
R0 000 449 (PCEH)

(Green)

Publication Entry

Education Service Centers

Potential Working Relationships Between ESA's and the R&D Exchange

see

SF 000 122 (Wayne County Intermediate School District)

(Yellow)

Appendix B

Proposed Format for a Revised Data Record Structure

The following forms are included:

1. Level I: Organizational Overview

2. Level II: Organizational Resources/General

3. Level III: Organizational Resources/Specific

    a. Subfile on Meetings
    b. Subfile on Products
    c. Subfile on Projects

RRS DATABASE/PROPOSED DATA RECORD STRUCTURE

LEVEL I

ORGANIZATIONAL OVERVIEW

TAG NO.	FIELD NAME
001	ACCESSION NUMBER
002	NAME OF ORGANIZATION
003	ADDRESS
004	TELEPHONE
005	CONTACT a. Name (Director) b. Title
006	AFFILIATION(S)
007	FUNDING SOURCE(S)
008	TYPE OF ORGANIZATION
009	GEOGRAPHIC AREA SERVED
010	PRINCIPAL CLIENTS
011	EDUCATIONAL LEVEL(S)
012	SIZE OF ORGANIZATION a. Number of Staff b. Number of Members
013	DATE FOUNDED
014	ABSTRACT/STATEMENT OF PURPOSE
015	DESCRIPTORS
016	IDENTIFIERS

RRS DATABASE/PROPOSED DATA RECORD STRUCTURE

LEVEL II

ORGANIZATIONAL RESOURCES/GENERAL

TAG NO.	FIELD NAME
020	PUBLICATION/INFORMATION SERVICES (Narrative description of programs, including target audiences, organizational literature available, resource collections, search services, etc.)
021	DEPARTMENT
022	CONTACT a. Name b. Title c. Telephone
023	DEPARTMENT
024	CONTACT a. Name b. Title c. Telephone
025	PERIODICAL a. Title b. Type c. Frequency d. Cost e. Cost (non members) f. Cost (libraries/institutions)
026	REPEAT OF 025
027	REPEAT OF 025
028	REPEAT OF 025
038	REPEAT OF 025
039	NOTES

TAG NO.	FIELD NAME
040	RESEARCH AND DEVELOPMENT ACTIVITIES (Narrative description of major areas of emphasis and target audiences. Includes Evaluation, Demonstration, and Dissemination.)
041	DEPARTMENT
042	CONTACT a. Name b. Title c. Telephone
043	REPEAT OF 041
044	REPEAT OF 042
045	REPEAT OF 041
046	REPEAT OF 042
047	REPEAT OF 041
048	REPEAT OF 042
049	REPEAT OF 041
050	REPEAT OF 042
051	NOTES
060	FIELD SERVICES, TECHNICAL ASSISTANCE, MEETINGS, (Narrative description of training programs and services, including major areas of emphasis, target audiences, mode of delivery, etc.)
061	DEPARTMENT
062	CONTACT a. Name b. Title c. Telephone
063	REPEAT OF 061
064	REPEAT OF 062
065	REPEAT OF 061

TAG NO.	FIELD NAME
066	REPEAT OF 062
067	NOTES
068	ANNUAL MEETING a. Year b. Location c. Theme

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RRS DATABASE/PROPOSED DATA RECORD STRUCTURE

LEVEL III

ORGANIZATIONAL RESOURCES/SPECIFIC

SUBFILE ON MEETINGS

TAG NO.	FIELD NAME
101	ACCESSION NUMBER
102	TITLE
103	TARGET AUDIENCE(S)
104	LOCATION
105	SPONSOR a. Organization b. Address c. Telephone
106	CONTACT a. Name b. Telephone
107	CO-SPONSOR a. Organization b. Address c. Telephone
108	CONTACT a. Name b. Telephone
109	NOTES (Indicate restrictions, fees, publication plans, etc.)
110	DESCRIPTORS
111	IDENTIFIERS

RRS DATABASE/PROPOSED DATA RECORD STRUCTURE

LEVEL III

ORGANIZATIONAL RESOURCES/SPECIFIC

SUBFILE ON PRODUCTS

TAG NO.	FIELD NAME
201	ACCESSION NUMBER
202	TITLE
203	AUTHOR (optional)
204	FORMAT a. Descriptors b. Number of Pages c. Length (if nonprint) d. Components (if kit) e. ERIC Publication Code
205	PUBLICATION DATE
206	PRICE
209	DESCRIPTORS
210	IDENTIFIERS
207	ANNOTATION (Optional)
208	AVAILABILITY a. Order Number b. Order Policy c. Ed Number (if available) d. Contact person e. Organization f. Address g. Telephone

RRS DATABASE/PROPOSED DATA RECORD STRUCTURE

LEVEL III

ORGANIZATIONAL RESOURCES/SPECIFIC

SUBFILE ON PROJECTS

TAG NO.	FIELD NAME
301	ACCESSION NUMBER
302	TITLE
303	ABSTRACT
304	TARGET AUDIENCES a. Primary b. Secondary
305	NOTES (Availability of information, completed outcomes, projected milestones, etc.)
306	ORGANIZATION a. Name b. Title c. Address
307	CONTACT a. Name b. Title c. Telephone
308	START/END DATES
309	DESCRIPTORS
310	IDENTIFIERS

Appendix C

Search and Retrieval System Alternatives for the RRS Database

The attached letters and information sheets were obtained from representatives of potential vendors of search and retrieval systems for the RRS database. They are included to acquaint the reader briefly with systems which would directly affect future users of a computer-based RRS information service.

Four vendors are represented. Batch search services are available from the Mechanized Information Center at Ohio State University. National vendors for online searching are Bibliographic Retrieval Services, Inc., Lockheed Information Systems, and System Development Corporation.

OSU

The Ohio State University

University Libraries
1858 Neil Avenue Mall
Columbus, Ohio 43210
Teletype 810 482-1042
Phone 614 422-6151

JUN 26 1979

June 25, 1979

Dr. John Peterson
Project Director, Research and Referral Service
National Center for Research in Vocation Education
1960 Kenny Road
Columbus, Ohio 43210

Dear Dr. Peterson:

We would like to work with your Center to provide an inexpensive and efficient search service for people wanting information on Educational Resource Organizations.

We have a proven MIC search system that has been providing batch current awareness and retrospective services for nine years. We have disseminated more than 20 million notifications of pertinent items during that time.

If you can provide the data base in machine-readable form in a format that is compatible with our software, we could offer SDI batch services for your users through our system.

There would be some costs involved. For example, we are charged for all the computer time that we use and we pass those charges onto our users. Based on your estimate of the size of the data base involved, the total cost to you would be probably under $5 per search.

We are in favor of combining the efforts of our organizations to provide information service for those who need it.

I hope we can explore the possibility of doing so.

Sincerely,

Bernard Bayer
Head, Mechanized Information Center

xc: C. Lynd

bb:sl

LITERATURE SEARCHES

MECHANIZED INFORMATION CENTER • THE OHIO STATE UNIVERSITY LIBRARIES

The Mechanized Information Center, a division of The Ohio State University Libraries, offers customized computer-based literature searches in almost any area of science, technology, business, the social sciences, education, and the humanities.

Features of computer-based searches include:

* individual consultation to provide assistance in determining information sources and developing search strategies
* save time previously used to search indexes by hand
* retrieve information more precisely by searching for specific terms or combinations of terms in ways a printed index can not be used
* more current information than usually is available in printed indexes
* a printed bibliography for personal use is provided

SOURCES USED

MIC searches data bases (computerized indexes) supplied by organizations outside The Ohio State University, so the searches are not limited to material in the OSU Libraries. Most data bases are oriented to a subject area or specific discipline, while others cover only a particular type of publication. Representative data bases include *Science Citation Index*, *Psychological Abstracts*, and *Current Index to Journals in Education*.

SERVICES

MIC offers both retrospective and current awareness (updating) services.

Retrospective Services

* one-time literature searches
* useful for term papers or literature reviews
* cover the past 2 or more years
* search results available in 3 to 10 weekdays

Current Awareness Services

* continuing searches at regular intervals
* useful for interests lasting 6 months or longer
* search results available bi-weekly or monthly

FOR MORE INFORMATION OR TO REQUEST A SEARCH, CONTACT:

Mechanized Information Center
The Ohio State University Libraries
126 Main Library, 1858 Neil Ave. Mall
Columbus, Ohio 43210

(614)
422 - 3480

Hours: 8:00 a.m. - 5:00 p.m.
Monday through Friday

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(over)

MIC LITERATURE SEARCH SERVICES

BATCH SERVICES

Batch services are provided through the facilities of the OSU University Systems Computer Center. Retrospective search results are available one week from the deadline day (last day for submittal).

Service Name	Service Type	Period Covered/ Frequency	Publications Covered	Data base* (Source)	Searchable Terms	Deadline 12:00 Noon
SCIENCE	Retrospective --- Current Awareness	latest 3 years --- bi-weekly	journal articles & books	SCI (ISI) & MARC (LC)	title words authors LC subjects LC call numbers	Wednesday --- every other Monday
SOCIAL SCIENCES	Retrospective --- Current Awareness	latest 3 years --- bi-weekly	journal articles & books	SSCI (ISI) & MARC (LC)	title words authors LC subjects LC call numbers	Thursday --- every other Monday
EDUCATION	Retrospective --- Current Awareness	latest 4 years --- monthly	journal articles & reports, books, etc.	CIJE (ERIC) & RIE (ERIC)	ERIC descriptors title words authors	Friday --- 3rd Tuesday each month
CHEMISTRY	Current Awareness	bi-weekly	articles, patents, papers, etc.	*CA Condensates* (CAS)	title words authors	every other Monday

* Key to abbreviations

CAS	Chemical Abstracts Service	MARC	Machine-Readable Cataloging
CIJE	*Current Index to Journals in Education*	RIE	*Resources in Education*
ERIC	Educational Resources Information Center	SCI	*Science Citation Index*
ISI	Institute for Scientific Information	SSCI	*Social Sciences Citation Index*
LC	Library of Congress		

ONLINE SERVICES

Online services are provided, via a terminal and telephone hookup, through the facilities of three organizations outside OSU: Lockheed Information Systems, Systems Development Corporation (SDC), and the Energy Research and Development Agency (ERDA).

There are more than 60 data bases in science, applied science and technology, social sciences and humanities, and business and economics available through these online services. Time period and publications covered, and searchable terms vary according to the data base used.

Retrospective online searches are conducted weekdays, by appointment. Results are available in 3 to 5 weekdays.

(Note: Use of ERDA data bases is restricted; inquire about availability).

Other online services available through the OSU Libraries are:

- MEDLINE and other related data bases: Health Sciences Library, 376 W. 10th Ave. (422-9810)
- New York Times INFORMATION BANK: Reference Department, Main Library, 1858 Neil Ave. Mall (422-6175)

Mechanized Information Center
The Ohio State University Libraries
126 Main Library, 1858 Neil Ave. Mall
Columbus, Ohio 43210
(614) 422-3480

rev 8/77

MAY 23 1979

BRS Bibliographic Retrieval Services, Inc.

Corporation Park, Bldg. 702
Scotia, New York 12302
(518) 374-5011

May 18, 1979

Mr. Chuck Lynd
Resource and Referral Service
National Center for Vocational Education
1960 Kenny Rd.
Columbus, Ohio 43210

Dear Chuck:

This letter will confirm our recent telephone conversation regarding a private database of documents on resource organizations which you are interested in making available through the BRS search system.

The standard costs for the BRS Private Database Service (PDS) will apply to your database and are as follows:

File Load: $1,000 (a one-time charge)

Storage Charges: $12 per million characters per month

Update Costs: $.05 per record with a minimum charge of $100

Searching Rate: $16 per connect hour plus communications costs

An exact monthly storage charge cannot be calculated until we have a better idea of the file size; based on your estimate of 8 million characters for the database after one year, the monthly rate would be about $96.

Special programming to produce photocomposition tapes from the database will be provided by BRS at an approximate cost of $1,000 with a $25 charge for each tape that is prepared.

I hope that this information is helpful in your planning for the project. Please contact me if you have any further questions.

Sincerely,

Kay Durkin

Kay Durkin
Vice President, Marketing

KCD/rd

PUT YOUR OWN PRIVATE DATABASE ONLINE!

Since its entry into the online information industry in 1977, BRS has quickly become known as the most innovative and cost effective online service vendor. Now, in addition to our standard BRS online search system for large commercially available bibliographic databases, we are introducing BRS/PDS – a comprehensive Private Database Service developed specifically for the creation, collection, storage, searching and maintenance of private databases.

WHAT CAN PDS DO FOR YOU?

Using PDS, you can build your own private file of information, search the file online, update the file as often as necessary, and produce documents ready for printing. The PDS system can be tailored to your specific requirement, whether it is for an existing or proposed file of any size or structure, bibliographic or numeric.

PDS is a **total** program for development of your own online database. It provides both professional and technical assistance in all phases of file management: file design, data collection, creation of a searchable file, maintenance of the newly developed file, and user training.

WHO CAN USE PDS?

PDS can be used in any environment – academic, industrial, governmental – by any institution that has a need for maintaining their own online file of information.

PDS can be helpful in . . .	for . . .
• libraries	• cataloging and acquisitions activities
• research laboratories	• storing and retrieving technical documents and bibliographic data
• manufacturers	• providing quick access to product files and safety information
• small businesses	• maintaining personnel records, customer data and sales lead files
• service organizations	• funding and grant information

HOW DOES PDS WORK?

As part of your PDS package, BRS will help you with all aspects of building and maintaining your file. Depending on your institution's needs, any or all of the following services can be provided:

1. **Create a machine-readable and searchable file.** BRS will:

   - help you build an information file "from scratch": determine your needs, define the file content and coverage, assist in data collection, develop a test file, evaluate the file, refine the file.

   OR

   - assist you in converting an existing machine-readable file so that it can be searched online.

2. **Provide online access to your file:** You or any of your affiliates can directly access your database online through standard telecommunication channels from your terminal to the BRS host computer in Scotia, New York.

3. **Maintain your file online:** You can update – add, change, or rearrange – data stored in your database as often as you like. Additions and/or deletions can be transmitted directly from your terminal to the BRS computer, so that your file will always be current and accurate.

4. **Produce printed tools:** PDS enables you to produce copy which is ready for photocomposition. This feature of PDS allows you to search any aspect of the database, specify a format for the search results, look at the end product, edit where necessary, and obtain magnetic tapes ready for photocomposition according to Government Printing Office (GPO) specifications.

5. **Train your database users:** BRS technical and educational staff will train your users in data collection, searching, and text editing activities specific to your database.

WHAT EQUIPMENT DO I NEED?

Online access to your private database requires only a standard teletype-compatible online communications terminal and telephone at your facility. You can enter, edit and transmit your data online to the BRS computer via either TELENET or direct dial.

PDS offers an optional system – PDS/1. With PDS/1, a microcomputer at your facility would be used to create, maintain and search your private file. In addition to performing any of these tasks separately, the PDS/1 system can also be used to search the private file on the BRS host computer while concurrently entering new data to update the file on the micro(s) at your location. Data entered on the PDS/1 system can be transmitted directly to BRS via TELENET or direct dial, or a disk of information from your microcomputer shipped to BRS for processing.

BRS/PDS IS COST-EFFECTIVE!

Check the table below to determine what your basic costs would be to use this sophisticated new BRS/PDS service. They will probably be significantly lower than you expect!

BRS/PDS Charging Scale

Item	Charge
Online data collection	$13.00 – $25.00 per connect hour, dependent on level of usage.
Initial file load (creation of searchable file from data collection)	$.05 per record with a minimum charge of $1,000.00.
File updating	$.05 per record, with a minimum charge of $100.00 per update.
Online storage of file	$12.00 per million characters per month.
Online searching of file	$13.00 – $25.00 per connect hour, dependent on level of usage.
Remote PDS/1 microcomputer system	$14,000-$16,000 purchase price, dependent on equipment included.

FOR ADDITIONAL INFORMATION:

If you are interested in discussing your particular file management requirements with BRS, you may contact:

BRS, INC.
702 CORPORATION PARK
SCOTIA, NEW YORK 12302
(518) 374-5011

Introducing . . .

BRS/PDS

The first total Private Database Service

Lockheed
PALO ALTO
RESEARCH
LABORATORY

3251 HANOVER STREET · PALO ALTO, CALIFORNIA · 94304

NOV 14 1978

November 10, 1978

Mr. Chuck Lynal
Resource/Referral Service
National Center for Vocational Education
Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

Dear Mr. Lynal:

Thank you for your inquiry regarding our DIALOG Private File Service. It is presumed that you are familiar with DIALOG information retrieval language (if not, you may wish to order our "Brief Guide to DIALOG Searching" @ $10.00).

We will plan to process your file consistent with other database on DIALOG. Consequently you will be able to search the free text of titles, abstracts and descriptor phrases as well as all formatted fields (such as author, subject headings, etc.). Furthermore, your files will be continuously available for searching and printing but only to those passwords which you authorize.

Enclosed is a current pricing sheet and a document describing our DIALOG Intermediate File Format. You might have your programmer review this format and call me if there are any questions. We are setting the service up this way because we feel it is less costly for you to adapt your file to our quite simple intermediate format than for us to analyze and program to your formats.

We are interested in your reaction to this service and would appreciate your comments when you have had a chance to review the material. If you wish to proceed directly, please inform us and we will draft a formal letter contract.

Sincerely yours,

Chas Bourne

Charles P. Bourne
Information Systems
Program Office

CPB/kir

Enclosure

LOCKHEED MISSILES & SPACE COMPANY, INC. · A SUBSIDIARY OF LOCKHEED AIRCRAFT CORPORATION

DIALOG PRIVATE FILE SERVICE
PROTECTION OF CONFIDENTIAL FILES

A comprehensive system of controls is presently in operation, to maintain, at the client's option, the confidentiality of records or files in the DIALOG Private File Service. Organizations that wish to use the Private File Service can do so with an assurance that procedures are in effect to restrict access to those records and protect any proprietory information in those files.

The security controls that are used with the DIALOG Private File Service include the following:

1. Password Control. A private file can be accessed only by a password that is authorized by the private file sponsor. That is, the only passwords that could get access to your file would be the one or more passwords assigned to you, or authorized by you (e.g., for use at your other facilities). The only exception to this is the access provided to a very small number of the DIALOG staff members on a need-to-know basis (for loading and testing the file). These passwords could be changed periodically if you need an additional degree of security.

2. Non-Visible File. The presence of public files on DIALOG can be determined through use of an online command, ?FILES. With private files no such association is provided and thus, even the file number is not known other than to authorized users. Knowledge of the availability of your file can be further limited by our treating it as a proprietary matter within our own organizations, so that even its existence or sponsor identity can be limited within the Lockheed organization to a small number of people.

3. Programming System Security. The computer programs associated with the control and operation of this total system have been designed to eliminate the possibility of unauthorized access to files or the work of other users.

4. Personnel. All of the DIALOG personnel have received extensive background checks as part of their pre-employment review, and all of them have received at least a confidential-level U.S. security clearance.

5. Physical Security. All of the computer operations associated with DIALOG take place in Lockheed facilities, and are under the control of DIALOG staff members. We operate our own separate computer facility for the DIALOG system, consequently no other Lockheed departments or non-DIALOG personnel have access to our computer facilities or files. Access to the computer room is restricted by a combination door lock.

(over)

6. Communications Security. All of the offline prints from any DIALOG search are handled and sealed for mailing by DIALOG staff members. The offline prints to be mailed to a user could be sent through registered or certified mail channels if the file sponsor wanted to exercise that option. That would provide additional control over the offline prints, but at the expense of some additional handling, delay and cost.

7. File Record Security. Input records for a file are received periodically from all file suppliers in magnetic tape form for addition to the file. The records are processed and stored on magnetic discs that are permanently mounted on the computer system. At the completion of that file loading or updating operation, a source tape could be returned to the private file sponsor if desired so that no machine records would reside on the Lockheed premises other than the ones that are permanently mounted on the disc files.

NOV 2 7 1978

2500 COLORADO AVENUE · SANTA MONICA, CALIFORNIA 90406
TELEPHONE (213) 829-7511

November 20, 1978

Mr. Chuck Lynd
1960 Kenny Road
Columbus, Ohio 43210

Dear Mr. Lynd:

The SDC Search Service brochure and our private data base development description is enclosed to provide you with a general picture of our commercial operation and our procedures for providing a private file. The Resource and Referral Service data base, as you described it to me on the phone last week, sounds like an ambitious project and one that deserves the most sophisticated online retrieval technology. As you check the sources available, I believe you will find the greatest system sophistication, the most innovative development record, and the finest hardware backup provided through SDC Search Service with ORBIT.

A demonstration of ORBIT seems the lext logical step to provide you with firsthand experience of ORBIT and to discuss its application to the special needs of your project. If you have further questions or wish to arrange for the demonstration, contact our Marketing Manager, Mr. Bill Burgess, in our Santa Monica office.

Sincerely,

Martha Bonner
SDC Search Service

MB/aa

Enclosure: Brochure
Private data base package

ORBIT PRIVATE DATA BASE ACCOUNTS

Since 1973, SDC Search Service has been providing private-file service to its users, under special contractual arrangements. This service enables owners of private files to enjoy the same type of ORBIT search capabilities available to users of SDC's publicly available files, without the major investment in software development, system maintenance, file design, and file maintenance that is typically associated with the use of in-house computers for on-line files.

SDC recognizes the critical importance of privacy to its private-file users. The operating system that SDC has chosen for its on-line services--IBM's Multiple Virtual Storage System--has been shown in numerous studies to provide far greater protection against penetration or accidental exposure than the "OS" system used on older IBM hardware.

In addition to this built-in system protection, SDC offers a unique Security Code system that permits users to change their own access code as frequently as they wish, to avoid any risk of compromise.

SDC does not retain any record of the content of searches conducted by its users, either on public files or on private files. We do not, under any circumstances, convey information about the content of private files to third parties and, even within SDC, we sharply limit awareness of the identity of private-file customers. We are willing to certify to these facts, in writing.

These conditions and policies supporting user privacy have made SDC the system of choice for private files.

SDC's Basic Private-File Package includes:

1) File design, programming, and initial load of data base. The cost depends on the file format option chosen for implementation.

2) File updating on a mutually agreeable schedule. The cost depends on the file format option chosen for implementation, as well as the size and frequency of updating.

3) Monthly storage of data base. The cost is based on file size.

4) File availability during SDC Search Service regularly scheduled operating hours at a fixed per-connect-hour charge.

5) Direct-dial access at no charge or access through telecommunication networks at SDC standard rates.

6) Off-line printing at a fixed per-citation charge.

7) As many ORBIT passwords as are required by the organization.

(Orbit Private Data Base Accounts - Continued)

8) Training of one member per organization at a regularly schedule SDC New User training session.

Supplementary Services Available include:

1) Preparation of a tailored user manual, including the basic ORBIT manual, and data-base-specific materials covering the private file.

2) Custom training covering ORBIT retrieval and data-base-specific instruction.

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